



Recording and Utilising Patient-Based Data in Clinical Settings: The Pressure Ulcer Case

AHMAD TUBAISHAT

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"Knowing a great deal is not the same as being smart; intelligence is not information alone but also judgment, the manner in which information is collected and used"

Dr. Carl Sagan
(American Astronomer, Writer and Scientist, 1934-1996)

DEDICATION

This work is dedicated to my *father*, who dreamed to see me as a doctor, but destiny was quicker and took him from our lives, just six months before the dream was completed. I will never forget you, Dad.

I also dedicate this work to my *mother* for her never ending love, her encouragement, and her suffering in my absence throughout this long journey.

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ABSTRACT

Pressure ulcers (PUs) are a very common health problem. Nurses in clinical practice collect large volumes of PU data every day, which must be recorded and used appropriately. With this in mind, this research explored how PU data is recorded and used in clinical settings. In addition, the magnitude of PU problem in Jordan was assessed.

A mixed methods approach was utilised to address the research objectives. As a first stage, Tissue Viability Nurses (TVNs) in the UK from the Tissue Viability Society (TVS) and the National Health Service (NHS) were asked to complete an online questionnaire. Subsequently, a number of them (n=16) participated in semi-structured interviews in order to complement and explain the questionnaire responses. In Jordan, a cross sectional point prevalence survey employing the European Pressure Ulcer Advisory Panel (EPUAP) methodology was conducted to measure the prevalence rate of pressure ulcers.

Integration between the questionnaire and interview results occurred on a number of different occasions. The questionnaire findings (n=167) showed there to be a difference in the prevalence rate between the primary and secondary settings ($X^2=20.59$, $df=3$, $p<0.001$), with an overall mean of 7%, and a range of 0.5-25%. It was also found that the prevalence survey and clinical audits (71.8%, n=120), conducted annually (40.9%, n=67) or monthly (22.6%, n=37) by TVNs (63.6%, n=105), were the most common methods of calculating the reported prevalence rate. The field notes taken during the interviews, which were analysed thematically using the template analysis approach, highlighted that PU audits can be conducted via additional methods to those reported in the questionnaires. These include: actual audits where patients are inspected by TVNs or link nurses; relying on the nurses to complete audit forms; and, finally, reviewing the recording systems to generate reports.

Moreover, the questionnaire findings showed that PU data is mainly recorded on a combination system (48.2%, n=79), or in some cases recorded on a computerised system (9.8%, n=16). The interviews again complement these findings by expanding that PU data can be recorded, reported and referred using paper, electronic or combination records. The advantages and disadvantages of each recording system were explored and defined into separate themes.

Additionally, conducting a PU audit requires certain tools. It was clear from the questionnaire that the Waterlow risk assessment scale (RAS) (88.8%, n=142), and the EPUAP classification tool (83%, n=132) were the most commonly used in the UK.

Regarding the uses of PU data, the interview findings showed that there are several. For example, it can be used to generate reports about PU in a given organisation, and these

reports can be used to provide feedback to the nurses, TVNs, and management, and could also prompt decisions about purchasing equipment, employing nurses or offering training in areas where there are high levels of PU cases. Prevalence and incidence data, in particular, can be used to evaluate intervention, to monitor quality, to ensure best practice is provided, as educational tools for conducting audits, and for initiating safeguarding and investigating procedures. Despite all these potential uses, however, some interviewees think that some PU data, especially the prevalence data, is useless and difficult to capture, and that incidence data is more reliable and powerful.

In Jordan, the researcher examined the skin of all inpatients aged eighteen or above, except patients in the emergency, day care, maternity and paediatrics wards, in both university and general hospitals. This yielded a sample of 302 patients. Any PU identified was graded according to the EPUAP grading scale (GS). The risk of PU development was assessed using the Braden scale. Data was also collected on preventive measures used in the clinical setting. Of the patients examined, 11.9% (n=36) had PU grade 1-4 (excluding grade 1: 6.6%, n=20). Interestingly, this PU prevalence rate is lower than that published in most studies which have employed the same methodology but it is thought that the differences in age and frailty in the Jordanian sample, compared with most others, could explain the low prevalence.

The sacrum and heel were the most commonly affected sites (55.6%, n=20). Grade one was the most common grade (44.4%, n=16) and 85 (28.1%) patients were considered at risk of developing pressure damages. Despite the relatively low prevalence, very few patients at risk received adequate prevention measures (16.5%, n=14), and there is therefore a need to raise awareness of the need for PU prevention in Jordan.

ABBREVIATIONS

DN	.....	District Nurse
EHR(s)	.....	Electronic Health Record(s)
EPR(s)	.....	Electronic Patient Record(s)
EPUAP	.....	European Pressure Ulcer Advisory Panel
GP(s)	.....	General Practitioner(s)
GS	.....	Grading Scale
IT	.....	Information Technology
LOS	.....	Length of Stay
N	.....	Number of cases in a subgroup of the sample
NHS	.....	National Health Service
NICE	.....	National Institute of Clinical Excellence
NPUAP	.....	National Pressure Ulcer Advisory Panel
PCT(s)	.....	Primary Care Trust(s)
PIS(s)	.....	Participants Information Sheet(s)
PPR(s)	.....	Paper Patient Record(s)
PU(s)	.....	Pressure Ulcer(s)
QUAL	.....	Qualitative
QUAN	.....	Quantitative
RAS(s)	.....	Risk Assessment Scale(s)
RCT(s)	.....	Randomised Controlled Trial(s)
SPSS	Statistical Package for Social Science
TV	Tissue Viability
TVN(s)	Tissue Viability Nurse(s)

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CHAPTER ONE:

INTRODUCTION

1.1 QUICK GUIDE TO THE CHAPTER

This chapter introduces the problem of interest and the research objective, outlines the background and the significance of the problem, then sets out the context and structure of the thesis.

1.2 INTRODUCTION

Data is the fundamental concept on which this study focuses, since no information can be acquired unless data is available (Ahsan and Shah, 2006). Of concern in this context is clinical data, which is data on patients gathered in practice by clinicians (Millar et al., 2009). In particular, the thesis is concerned with data on PUs, collected by nurses in clinical settings. It covers all the elements of PU data, including prevalence, incidence, risk assessment, grading and prevention.

Data is a concept of high interest in the discipline of nursing informatics, which Graves and Corcoran (1989, p.227) define as “a combination of computer science, information science and nursing science to assist in the management and processing of nursing data, information and knowledge, to support the practice of nursing and delivery of nursing care”. Thus, nursing informatics as a speciality begins with the basic concept of data, as does the present research.

Nursing informatics can be applied in four areas: clinical, administration, research and education (Hannah et al., 2006). This study applies its concepts to a clinically oriented subject: that of PU data. It has been selected because of the importance of this problem, in terms of its size, the costs of prevention and treatment, its complications and consequences for the patients on one hand, and because relatively little work has been published applying nursing informatics to the PU field on the other. Nursing informatics deals with the data that is processed to support nursing care, and PU data is one type which has to be processed to support and improve the delivery of patient care.

1.3 PERSONAL MOTIVATION

The researcher’s interest in this subject arose from the importance of nursing informatics in nurse’s daily practice. Nursing informatics specialists have a special role in using information technology (IT) to enhance the safety, effectiveness and quality of healthcare (Murphy, 2010). All providers of healthcare should be skilled in exercising IT to make decisions that lead to better care (Saba and McCormick, 2006).

As a nurse with clinical experience of caring for PU patients who has observed the magnitude of the physical and psychological impacts of this problem on patients and their families, the researcher decided to study this area. The association of PU and its complications with death in many situations (Brem and Lyder, 2004, Landi et al., 2007) provides enough motivation to start digging in this area. The researcher was first moved to understand how PU data is recorded and used in practice, in an effort to understand the difference between paper and electronic records, then to quantify the problem in his home country, Jordan, and to provide a basis on which health policymakers could build prevention programmes in Jordan, where none is yet in operation.

1.4 STATEMENT OF THE PROBLEM

A search of the literature indicates that PUs pose a very common and prevalent health problem; without an accurate assessment of PU data, the problem will continue to grow. Nurses in clinical practice collect and record large volume of PU data every day. This must be recorded and used appropriately, given that recording and utilising patient data is a fundamental duty of any healthcare provider (Millar et al., 2009). Further, in a second study, urgent identification of prevalence data in Jordan is necessary, especially as no published work on this has been located. Thus, the primary focus of this study is on the problem of PU, identifying its size and how PU data is recorded and utilised in practice.

1.5 OVERALL RESEARCH AIM

The overall research aim is to explore how **PU data** is *recorded* and *utilised* in clinical settings. The aim in the part of the study set in Jordan was to measure the PU prevalence rate in Jordan, which is a type of PU data. There are many other secondary objectives, each applying to a part of the study or to a method, which are presented in chapter 3, on methodology.

1.6 DEFINITION OF TERMS

Many specific terms have been used in formulating the overall aim. Operational definitions of each of these are presented below:

PU data: raw facts related to the PU concept, including prevalence, risk assessment, ulcer grading and prevention data. For instance, it may be that the prevalence rate for a specific ward is 5%, the Waterlow risk assessment score is 10 (Waterlow, 1985), a patient's PU grade is 4 and the patient is repositioned in his bed every 2 hours. All these represent clinical data related to the PU problem.

PU data recording: recording and documenting of the PU data specified above in the patient's medical record, whether on paper or in electronic format.

PU data utilization: the uses in practice of the PU data that has been collected and recorded, i.e. what use is made of this data and the benefits obtained from it.

Clinical settings: the care settings where patients' clinical data, including PU data, is usually collected, recorded and used. Most commonly, these are primary (i.e. community) and secondary settings (e.g. hospitals).

1.7 BACKGROUND TO THE STUDY PROBLEM

1.7.1 Scope of the problem

The EPUAP is a group whose purpose is to guide all European nations in preventing and treating PUs. It defines a PU as a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear. A number of contributing or confounding factors are also associated with pressure ulcers; the significance of these factors is yet to be elucidated (EPUAP and NPUAP, 2009).

These ulcers, regardless of their cause, have many negative holistic consequences for patients, including pain (Reddy et al., 2003, Gunes, 2008), longer hospital stays (Anthony et al., 2004), decreased quality of life (Price, 1998, Neil and Munjas, 2000) and increased costs in terms of care provider time and money (Clough, 1994, Severens et al., 2002, Bennett et al., 2004). PUs have been identified among the most physically debilitating complications in the twentieth century (Burdette-Taylor and Kass, 2002). According to Shahin et al. (2008a), they constitute the third most costly problem after cancer and cardiovascular diseases in the Netherlands.

In fact, there are many complications of PUs, including infection, sepsis and osteomyelitis (Thomas, 2001). It has been found that more than half (51%) of long-term care patients with PUs have methicillin-resistant *Staphylococcus aureus* (MRSA) infection (Capitano et al., 2003). Furthermore, PUs are linked with a doubling of mortality, regardless of the origin of the ulcer (Brem and Lyder, 2004). This is consistent with a study by Landi et al. (2007), who investigated the connection between PUs and the risk of one-year all-reasons mortality in a community of very old people and found a significant difference between the PU and non-PU groups in mortality rate: 29% vs. 14% ($p < 0.001$) respectively. After adjusting for all important variables between the groups, they found that participants in the PU group were expected to die sooner than those in the non-PU group.

1.7.2 Size of the problem

The size of such problems can be measured using prevalence and incidence estimates in any healthcare setting (Davis, 1998). A plethora of literature related to the incidence and prevalence rates of PU is available. For example, in acute care the prevalence rate was found to be between 12% and 19.7% in the USA (Jenkins and O'Neal, 2010). A Canadian study reports a prevalence of 25.1% (Woodbury and Houghton, 2004), while across five European countries including the UK the prevalence was 18.1% (Vanderwee et al., 2007a). A systematic review revealed that in acute care settings in the USA and Canada, PU incidence ranged from 8.5% to 13.4%, while in the UK it ranged from 2.2% to 29% (Kaltenthaler et al., 2001). This suggests that the problem is substantial and globally widespread.

1.7.3 Cost of the problem

There are several studies predicting the cost of this problem, frequently associated with the prevention of new ulcers or managing existing ones. Bennett et al. (2004) performed a study in the health and social care system in the UK and found that the cost of treating a PU varied from £1,064 (Grade 1) to £10,551 (Grade 4) and that there was a direct positive relationship between PU grade and cost. Complications occurred in severe stages, since healing took a long time. They conclude that the annual cost of treating PUs in the UK was £1.4 to £2.1 billion, representing around 4% of total NHS spending, and that most of this was the cost of nurses' time.

In the US, approximately 2.5 million PU patients are treated every year in acute care settings, at a cost of \$11 billion (Sullivan, 2008). The cost of PUs in the Netherlands is reported to range from \$362 million to \$2.8 billion, which is approximately 1% of the national healthcare budget (Severens et al., 2002). Together, these studies indicate that the cost of treating PUs is high everywhere.

1.8 SIGNIFICANCE OF THE STUDY

The consequences, complications, magnitude and costs of treating this problem clearly indicate the significance of the study and justify the choice of the PU problem as its focus. In fact, reliable PU data is needed to deal with this problem, especially as there is inaccuracy in recording PU data (Gunningberg et al., 2000, Gunningberg et al., 2001a, Gunningberg and Ehrenberg, 2004), which may arise from the subjectivity and unreliability of detecting and grading PUs, specifically in the early stages of their formation (Benbow, 2004). One study disclosed that a third of PU cases were not documented by nurses, who failed to grade non-blanching erythema as a grade one PU (Chan et al., 2005). The problem of inconsistency in recording PU data cannot be overcome without accurate and complete recording systems, whether electronic or paper-based.

It has been seen in several studies that the use of electronic systems for recording patient data contributed to an improvement in the accuracy, completeness and quality of patient records ($p < 0.01$) and by eradicating redundant paperwork, improved nurse's use

of time and contentment (Stengel et al., 2004). The majority (75%) of nurses in one study believed that computerising patient records would improve the quality of documentation, safety and patient care (Moody et al., 2004). This view is supported by Mahler et al. (2007), who found that the completeness of patient records represented by high quality documentation was noticed in 20 documents assessed by two nurse experts at three appointed time slots in different wards.

Many benefits have been ascribed to electronic health records (EHRs): they make clinical data available all the time, which facilitates timely decision making; they can reduce redundant testing, improve the utilisation of radiological examinations and reduce errors in bills, thus lowering costs and improving incomes (Wang et al., 2003).

In brief, it has been noted that EHR systems can improve the quality of various types of clinical data. However, few studies have explored whether they improve PU data recording. Given the size of the PU problem, accurate identification is important. The work reported in this thesis explored the recording and use of PU data in both paper and electronic formats, highlighting the advantages and disadvantages of each recording system. Reliable data on PU in Jordan was also obtained by the researcher.

1.9 CONTEXT OF THE STUDY

The research was conducted in two major settings: the UK and Jordan. For the purpose of simplification, the two studies are presented separately, because they used different methodologies. Although they addressed two different questions and were physically separate, they share the same theme: PU data. Study One, in the UK, explored how PU data was recorded and utilised in clinical practice, while Study Two explored some aspects of PU data more deeply, by collecting prevalence, risk assessment and prevention data in Jordanian settings.

Study One combined quantitative (QUAN) and qualitative (QUAL) methods, addressing the research questions by means of a survey questionnaire and semi-structured interviews, while Study Two used a prevalence survey of Jordanian settings.

As explained in Section 1.11 and Figure 1.1, each chapter deals separately with the two studies in order to help the reader to follow the research objectives, except in the literature review chapter, where material concerning the two studies is merged, since all elements of PU data are discussed in relation to the goals of both studies and it was unfeasible to separate them.

1.10 RESEARCH JUSTIFICATION AND RATIONALE

Reporting two studies in the same thesis is justified in that they are interrelated, both concerning PU data. Study One explored how PU data is recorded and utilised in the UK. In Jordan, no PU data had been collected before and there was no idea how such data are recorded and used in practice. Thus, the second study was a continuation of the first; concentrating on some aspects of this data among a different population in different settings. Indeed, the absence of any prior study of PU prevalence in Jordan provided the rationale for conducting the second study there.

The decision to conduct the prevalence survey in Jordan was in the event supported by the findings of the UK study, as reported in Chapter 4. It was clear, especially from the QUAL phase of the UK study, that the prevalence rate could be calculated on the basis of nurses' reports of PU cases to the TVN, or by reviewing the recording system based originally on nurses' reports, which would exclude some underreported cases from the prevalence calculation and yield inaccurate prevalence data. This provides a strong argument that calculating the prevalence rate using a validated tool by examining each patient's skin is more accurate in this regard, thus further justifying the Jordan prevalence survey, where the researcher himself examined each patient's skin and calculated the prevalence.

1.11 STRUCTURE OF THE THESIS

The content of this thesis is organised into six chapters. Figure 1.1 outlines the research process and the related chapters. Each chapter is organised into several sections and sub-sections. Each chapter begins with a brief overview of its content and ends with a summary and conclusion, to help the reader's orientation within the overall structure.

To avoid confusion, some terms are used with specific denotations: “research” refers to the whole of the work reported in the thesis, “study” refers to each of the two separate parts conducted in the UK and Jordan, and “phase” refers to the QUAN and QUAL phases of the first study. The content of each chapter is as follows:

Chapter one gives an overview of the thesis, identifying the research problems, the reasons for undertaking the research, its objectives and its significance.

Chapter two reviews the existing literature on the recording and utilising of clinical data in practice, both in general and for PU data in particular. The literature reviewed covers as well PU prevalence. The theoretical underpinning of the research is also presented and discussed in this chapter. The two studies are considered together, since the topic of PU data applies equally to them both: the first concerns the recording and use of PU data and the second the data itself.

Chapter three delineates the research methods used to collect data for analysis. It is organised into two main sections, covering the methods used in the UK and Jordanian settings, since these were different: mixed methods were used in the former and a prevalence survey in the latter. The justification for each research strategy is explored.

Chapter four presents the results of each study separately, further separating the UK results into those from the QUAN and QUAL phases.

Chapter five discusses the main findings in light of the research objectives and the reviewed literature. There is further discussion of the findings in relation to the theoretical framework of the research, in addition to methodological considerations. Since the QUAN and QUAL phases of the UK study addressed the same research questions, their findings are discussed in one section, separate from those of the prevalence survey in Jordan.

Chapter six draws conclusions from the two studies together. The unique contribution of this research to knowledge is set out. The chapter also discusses the implications of the findings at clinical, administrative and research levels, in addition to the limitations of each method used.

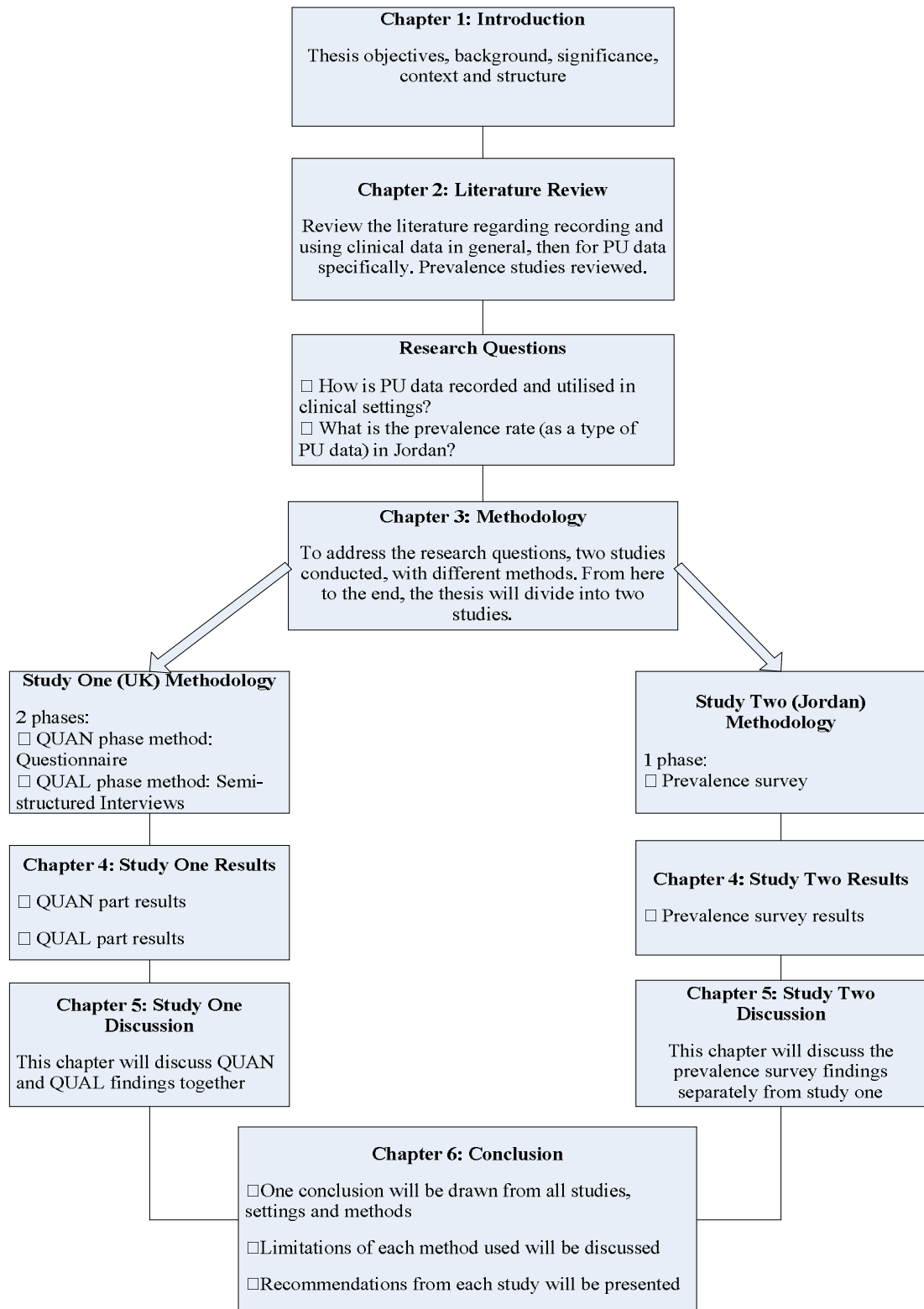


Figure 1.1 Overview of the thesis structure and the research process

1.12 SUMMARY

This chapter has identified the research problem and objective. The terms used in this thesis have been defined, in line with the research aim. The background to the PU problem has been clarified in term of size, cost, consequences and complications in order to understand the problem. The need for appropriate recording and use of PU data was discussed in the research significance section and the decision to conduct the research in two separate countries has been justified. The context and structure of the thesis were also set out.

The next chapter offers a critical review of the literature in order to facilitate an understanding of the problem of recording and utilising PU data in practice, and of all aspects of PU data. It also seeks to identify gaps in the literature.

CHAPTER TWO:

LITERATURE REVIEW

2.1 QUICK GUIDE TO THE CHAPTER

This chapter reviews the literature on the topic of interest. It begins by explaining the search strategy. The literature reviewed concerns first the recording and utilising of clinical data in general, then PU data in particular. The review concerns specifically PU prevalence, and some supportive literature regarding different aspects of PU data, including risk assessment, grading and prevention were presented. The chapter also discusses the theoretical framework that guides the research.

2.2 SEARCH STRATEGY

2.2.1 Strategy overview

The literature review process was guided by the research questions and objectives. There are three main themes: recording PU data, utilising PU data and PU prevalence. Several electronic databases were searched to identify the relevant literature. These were the Cumulative Index to Nursing and Allied Health Literature (CINAHL), the British Nursing Index (BNI), MEDLINE, the International Bibliography of the Social Sciences (IBSS), the Applied Social Sciences Index and Abstracts (ASSIA) and the Cochrane database for systematic reviews (CDSR), in addition to Google Scholar. The search procedure of these resources was performed using a group of keywords listed in Appendix A1.

The grey literature was reviewed at some points. This term refers to the wide range of materials that cannot be located by searching conventional publishers; including reports, conference proceedings, theses, standards, official documents and websites (Cordes, 2003). For this research the EPUAP and National Pressure Ulcer Advisory Panel (NPUAP) websites were reviewed, since they are specialists in the PU field. Some tissue viability (TV) reports available online were searched as well. Although these sources have been criticised for not being peer reviewed, Conn et al. (2003) found no difference in methodological strength between the published and grey literature. Although the published literature presents more statistically significant findings, according to Alberani et al. (1990), the grey literature is also useful in providing reliable research data.

2.2.2 General inclusion criteria

- No time limit was set when searching the topic, but most of the studies included were conducted within the past 10-15 years.
- The studies included should use a key research method.
- The studies should have credible results.

2.2.3 General exclusion criteria

- Any study found not relevant to the topic following the sifting procedures identified below.
- Any study about personal opinion or experience that had no key method and credible results.
- Any article not published in English.

2.2.4 Sifting procedures

- From the title, any irrelevant materials were removed.
- For the remaining articles, the abstracts were read and eligible studies were identified.
- The full text was read if the material was judged relevant and eligible by the abstract.
- All articles remaining after these filters were appraised and included in the review. Where a highly relevant article was located, the snowballing technique was used on its reference list to obtain more direct and specific literature (Higgins and Green, 2006).

Specific criteria was followed when the main themes of the research were systematically reviewed using all of the databases listed above. First, the review concerning the recording of PU data included all the available studies researching the topic of recording or documenting PU data in patient records, whether paper or electronic. Second, the material on utilising PU data included any article about using PU data in practice, whether in primary or secondary uses. Third, since there is a great deal of research literature on the theme of PU prevalence, and general identification of the size of the problem is required, the following criteria were used to select the prevalence studies: they should be peer reviewed epidemiological studies whose main concern is PU prevalence, in any setting. No grey literature on prevalence was included, since the reported figures should be methodologically sound. Studies using prevalence as a

secondary outcome to evaluate prevention protocols or educational programmes were excluded, as were paediatric studies.

All articles included in the review should comply with the general and specific inclusion and exclusion criteria, and then follow the sifting procedures. These processes summarised in Figure 2.1.

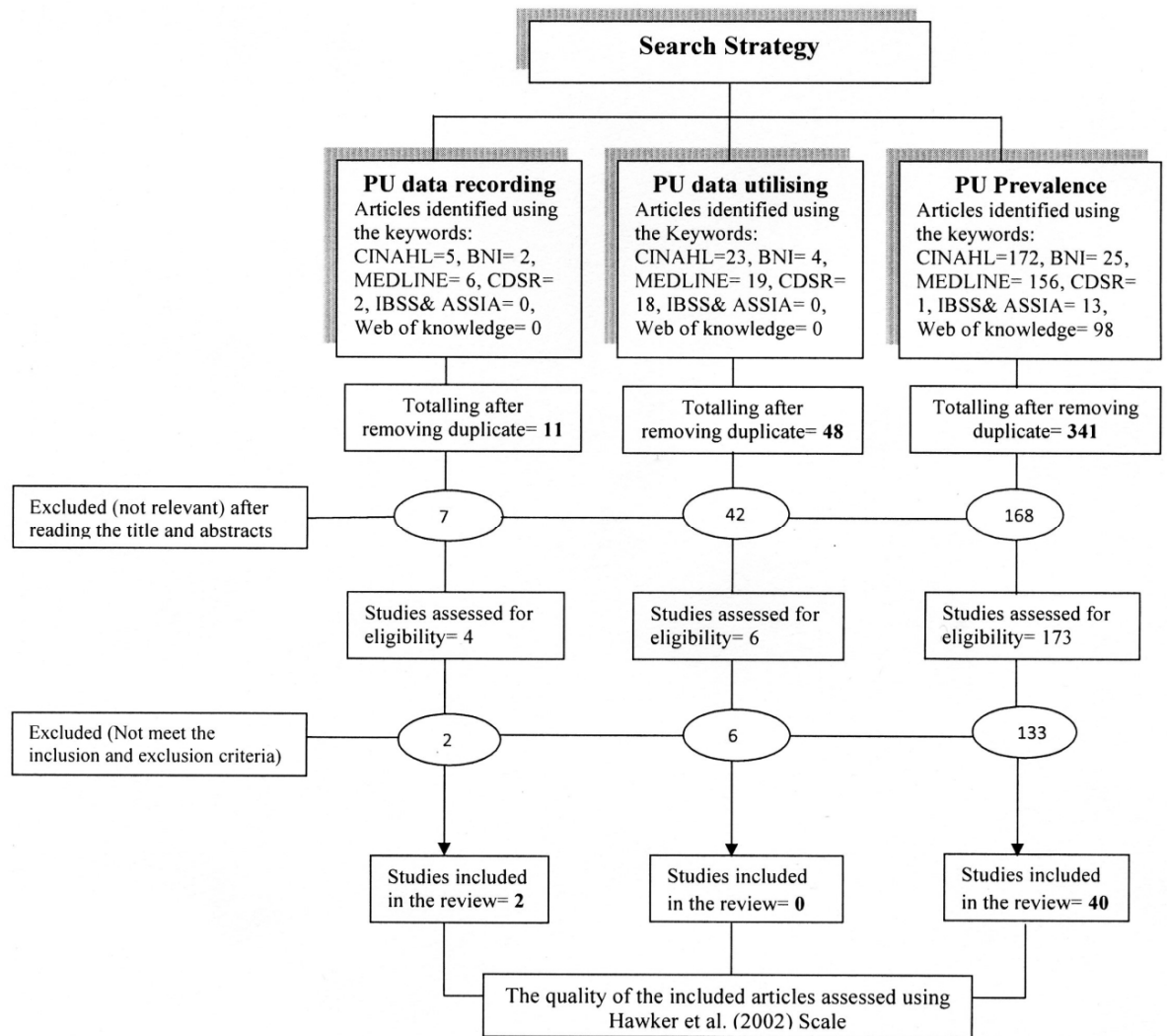


Figure 2.1 Search strategy for the main themes of the research

Some other supportive literature was also reviewed, either to introduce the topic, as in the case of recording and utilising clinical data in general, or to strengthen some piece of data already collected, for example, there are many RASs reported in the literature, but the main concern in the review was the psychometric properties of Braden scale (Braden and Bergstrom, 1987), since it was to be used to collect some data in Jordan. Similarly, in PU grading data, several classification systems are used, but this research concentrated on the EPUAP system for the same reason. Likewise, a large number of studies on PU prevention were available, only two of which, where data was collected in Jordan, were considered relevant, these specifically support surfaces and repositioning.

2.2.5 Trends in the literature

There is a plethora of research regarding PU data elements worldwide, but not in Jordan. Appendix A1 lists the number of hits before sifting. However, very few studies were found on the recording of PU data in practice; although, for example, there were 11 studies from the all searched databases before sifting (Figure 2.1), the relevant and eligible studies on this theme were scant, where only two studies located (Gunningberg et al., 2008, Gunningberg et al., 2009), which assessed the effectiveness of electronic recording of PU data, whereas the current research is more broadly concerned with recording in general, whether paper or electronic. The utilisation of PU data was also very difficult to write about, since no related articles were located. A larger number of studies found relatively for the last theme, where 40 studies were included in the PU prevalence review after following all the inclusion and exclusion criteria and sifting procedures.

Those articles which were determined to be relevant to the study topic were imported into EndNote, a reference management program (EndNote, 2008), which was used for referencing, as a backup library for relevant literature and to remove any duplication in the literature identified. As this software is compatible with Microsoft Word, it was used to insert citations into a Word document and to generate the reference list for the whole thesis.

The search for literature was a continuous process throughout this research. The literature was searched up to 2008 when the research started, then again later to cover any work published during the research period (2008-2011). The numbers in Appendix A1 represent the literature searched up to April 2011.

A framework or tool was needed to evaluate the quality of the accepted articles for the review. Since there is no universal tool, any one designed to assess the quality of research articles would have been adequate. The one adopted was Hawker et al. (2002) tool (Appendix A2), which is can be used to evaluate research from different paradigms. It is consists of nine elements that started from the abstract and titles, and end with the implications and usefulness. The quality of each element assessed according to this tool

into a continuum from good to very poor; the definition for each one is provided as well.

In fact, all empirical studies accepted for the current review were exposed to this tool to assess all their elements and to ensure that the quality of all reviewed articles was adequately and similarly assessed. However, there was a common problem in that not all articles provided adequate details of certain elements, especially their methodology. Therefore, in many cases the evaluation was limited to what was reported.

The following sections and subsections present a critical review of the literature on each theme of the research. That was done by presenting general works on the recording of clinical data in general, then for PU data. The same followed in the theme, using of PU data. Then, material on aspects of PU data, including prevalence, risk assessment, ulcer grading and prevention are presented, with more focus on the prevalence as one of the major research's theme.

2.3 RECORDING OF CLINICAL DATA

2.3.1 Clinical Data

There are many definitions of data, all of which reflect the same idea. Graves and Corcoran (1989, p.227) define data as “discrete entities that are described objectively without interpretation”. Georgiou (2002) similarly describes data as facts without meaning, an example illustrating this by pointing out that giving a patient's weight as 130 lb, without additional data, is to give a meaningless fact which cannot be interpreted. The interpretation of data to produce information requires the processing of this data (Graves and Corcoran, 1989), by organising it so that the patterns and relationships between items of data emerge (Nelson, 2002).

Among the different types of data which exist, the concern of this research is clinical data, which is data collected about patients by clinicians, including nurses, and which can be in the form of numbers, words or images (Millar et al., 2009).

As mentioned, data is processed to produce information regarding patients' needs. Nurses use their knowledge database to interpret this information, then apply their judgment and wisdom to initiate a plan to provide care of appropriate quality to individual patients, groups and communities (Saba and McCormick, 2006). This represents the theoretical framework that guides the research, as will discuss in section 2.12. The Nelson data-to-wisdom continuum will be used for this purpose (Nelson, 2002).

Nurses and other clinicians spend much time collecting, recording, analyzing, using and communicating patients' data via patient records, including PU data on prevalence, risk assessment, ulcer grading and prevention. Like all clinical data, this large body of data needs to be recorded appropriately, using a systematic method to name, manage, organize and store it in a database, either on paper or electronically (Saba and McCormick, 2006). Some of the most important features of such a database are the ease of finding data, its accessibility and availability in any requested form (Saba and McCormick, 2006). Any recording system for patient's data should support these features (Lelliott, 2003), which in turn can support the provision of clinical care and meet administrative information requests (Millar et al., 2009).

2.3.2 Patient medical records

The terms 'patient record', 'medical record', 'health record' and 'medical chart' have been used interchangeably in the literature to denote a store of data about a single patient, obtained and recorded during the patient care process (Tang and McDonald, 2001). It contains both clinical data (e.g. nursing assessments) and ancillary data (e.g. diagnostic data, laboratory results and treatment data) (Luo, 2006).

Medical records serve many purposes, which may be classified as primary or secondary. The primary purposes of these records mainly concern the clinical care of patients (Ehrenberg and Ehnfors, 2001), where according to Chandra and Paul (2004) they are used to record an account of each patient's health. Urquhart et al. (2009) emphasize that these records help to preserve the continuity of care that patients receive by sharing their data, amounting to a history of care received, among the multiple clinicians and facilities providing this care. In addition to these primary uses, demand is increasing to

use patient records for secondary purposes, like planning of care, assessment of quality, monitoring of performance, allocation of resources and research (Ehrenberg and Ehnfors, 2001, Tang and McDonald, 2001).

Medical records can be held on paper or in electronic form. These two modes differ greatly in terms of data entry and extraction (Tang and McDonald, 2001), but they share the same primary purpose: direct patient care. There is no agreed best method to record and share patient data, and in the PU field it is an under-researched topic. Hence, the present research explores the advantages and disadvantages of each recording system for PU data and presents these clearly for the reader.

2.3.3 Recording data in the patient record

The recording of clinical data refers to entering patient data into the medical record in either paper or electronic format (Millar et al., 2009). For instance, nurses may record the vital signs of post-surgical patients every hour, or the dose of an analgesic medication given to a patient experiencing pain, or the iron level of a pregnant woman visiting a health centre. The recording of PU data in either a paper-based or electronic record will depend on the hospital policy.

Recording or documenting patient data is an essential part of nursing care and cannot be detached from utilising this data in practice. The most significant reasons for documenting patient data as perceived by nursing homes nurses are to keep patient records as a tool in daily clinical practice and for patient safety (Ehrenberg, 2001).

Nurses and all other healthcare professionals are legally responsible for any unsatisfactory documentation in a medical record. The UK Nursing and Midwifery Council (NMC) guidance for good record-keeping states that this practice is a fundamental part of nursing care and that it is necessary to safe and effective care (NMC, 2010). It may be used as documentary proof of services provided and nurses must not falsify records (NMC, 2010). Serious inadequacy in nurses' documentation of patient care could have a major impact on the quality of care and the communication channels between the caregivers (Ehrenberg and Ehnfors, 2001). Such inadequacy in documentation may occur because of any of a variety of barriers as perceived by nurses,

among which heavy workload, lack of staff and shortage of time are most commonly identified (Brooks, 1998). Nurses surveyed thought that not all patient data needed to be recorded in patients' files, erroneously presuming that other clinicians would recognise that a procedure had been carried out because it was very simple, so there was no need to record such data (Brooks, 1998). Poor writing skills also play a major role in the inadequacy of documentation, when nurses uncomfortable with their writing ability shorten their documentation to fit what they know (Brooks, 1998). An additional factor affecting the quality of written documentation is the oral culture in nursing, especially as nurses favour the oral transfer of data over written media (Lamond, 2000). However, there is a basic assumption that what is not recorded has not been done.

Thus, nurses may report more problems than are recorded in the medical records. To assess the accuracy of data recorded in patient records, Ehrenberg and Ehnfors (2001) compared nursing documentation in 85 patient records with the descriptions of certain problems as reported by the patients and their caring nurses from seventeen nursing homes. The findings showed substantial deficiencies in the accuracy of medical records in relation to the patients' and nurses' reports: only 11-59% of the reported problems were recorded, meaning that nurses did not record all patient-related problems. This suggests that there are limitations in using patient records as sources of data for the planning, development and evaluation of care. However, the homes were selected by convenience sampling and the documentation practice between such homes may vary, which limits the external validity of the reported findings.

In fact, access to reliable, accurate and high quality data is a requirement for good judgment, coordination of care, and evidence-based practice. Clearly, patient records are written only once, but read several times (Oroviogicoechea et al., 2008), so it is essential to record the data accurately. In fact, this is not the case most of the time. Two main problems in recording general patients' data are noted in the literature. The first is underreporting of a problem by the absence of proof of documentation, PU being one such important problem, and the second is inaccuracy or incompleteness in recording by omitting some component of the documentation.

In one study of PU underreporting, the percentage of patients with PU on admission was 12.8%, but an audit of their records showed that no PU data was recorded during their

entire stay in the hospital (Williams et al., 2000). A similar study revealed that 69% of PU patients had no documentation of ulceration during admission (Courtney et al., 2006).

Even if it is recorded, there is inaccuracy or incompleteness in PU data, which constitutes the second problem of data recording. For example, Gunningberg et al. (2001a) found that preventive interventions were recorded only for patients with PUs, not for those at high risk. The lack of nursing documentation regarding PU data may indicate that nurses either did not know that a patient was at higher risk or did not view PU as a prioritized nursing problem; in either case, this constitutes a major problem for any healthcare system.

A prospective study was conducted to assess the nursing documentation of PU data for 55 patients with hip fractures in two hospital orthopaedic wards (Gunningberg et al., 2000). The patients were assessed on admission by emergency department nurses, then by ward nurses every day up to two weeks. The patient records were audited retrospectively by the first author and a skilful orthopaedics nurse to record any element of PU documentation. Of the 45 patients with PUs (25 at admission and 20 newly developed), the records of only three (7%) were judged as comprehensive, providing a description of the PU problem, the planned and implemented interventions and the nursing outcomes. This indicated a lack of nursing documentation of some parts of PU data in this group of patients. However, the researchers relied on the nurses on duty to perform the assessment, which left open the possibility of underreporting, especially as many nurses in this study did not regard grade one as a PU. Moreover, the data audited from the record could be misinterpreted and the reliability of the two auditors is not discussed in the study, whose small sample size could limit the generalisability of its findings.

Another way to assess the inaccuracy of these records is to compare them with more objective measures, such as the physical examination of the patients. Gunningberg and Ehrenberg (2004) found that the PU prevalence rate obtained from the patient records was 14.3%, whilst when patients' skin was examined the prevalence was 33%, indicating that PU data in patient records is of poor quality and accuracy. Again, this is in line with the recommendation of Ehrenberg and Ehnfors (2001) that medical records

should not be taken as a valid and reliable source of data. More emphasis should be given to the quality of clinical data by introducing the idea of the EHR (Gunningberg, 2006, Gunningberg et al., 2008, Gunningberg et al., 2009). The introduction of IT in healthcare in general and the EHR in particular is discussed in the following sections.

2.4 INFORMATION TECHNOLOGY IN HEALTHCARE: AN OVERVIEW

The world has been changed by major developments in IT and the internet, affecting all areas of endeavour including the healthcare industry, where great emphasis is now given to the control of quality, cost, efficiency and effectiveness (Englebardt and Nelson, 2002). However, the healthcare industry still depends largely on paper record systems for patient care (Saba and McCormick, 2006), in contrast to other industries like insurance, banking and travel, where businesses is automated to deal effectively and competently with larger numbers of clients. If the healthcare system delays the development and implementation of IT, it will lag behind such industries in advancing the quality of care (Saba and McCormick, 2006), given that IT reduces risk, increases accuracy, improves quality, lowers costs and facilitates auditing and research (Berk et al., 2008).

At present, health organisations produce substantial amounts of data that must be collected, recorded, retrieved and stored for use by all healthcare professionals, whether single practitioners, small groups or members of staff of large healthcare organisations (Englebardt and Nelson, 2002). Human ability is limited in acquiring such large quantities of data and in integrating the knowledge developed from it into practice (Ahsan and Shah, 2006). Thus, in order to manage such data, IT should be adopted in healthcare in general and the computerisation of health records is a particularly important development (Hannah et al., 2006). The use of IT could enhance the quality of healthcare data, by providing a structured means to access, store and interpret it (Ginneken, 2002), enabling professionals to collect reliable and accurate data on their patients (Thiru et al., 2003), assisting the making of informed decisions, in addition to

the effective and timely care that patients could receive (Englehardt and Nelson, 2002). Another purpose of such technological applications is to facilitate the exchange of information between organisations and settings (Hannah et al., 2006). EHR users can easily exchange data between clinicians, across all health sectors and even between different countries (Urquhart et al., 2009).

2.5 ELECTRONIC RECORDING SYSTEMS

Computer-based systems for handling patients' data and information have several names, including EHR, electronic medical records (EMR), computer-based patient records (CPR), or electronic patient records (EPR). All these terms are used interchangeably in the healthcare field (Englehardt and Nelson, 2002, Coiera, 2003, Marin, 2007). For the purpose of simplification, the abbreviation EPR will be used synonymously with the other abbreviations used elsewhere, while the abbreviation PPR will be used to refer to paper-based patient records.

The International Organisation for Standardization (ISO) (2005, p.2) defines the EPR as:

“Repository of information regarding the health status of a subject of care, in computer processable form, stored and transmitted securely and accessible by multiple authorized users. It contains retrospective, concurrent, and prospective information and its primary purpose is to support continuing, efficient and quality integrated health care”.

It is usually expanded to include other functions, such as order entry for tests and medications (Coiera, 2003).

The EPR contains two main types of data: clinical and non-clinical. The former applies to clinical care elements including nursing care plans, physicians' orders, medical treatment and referrals, demographic data and medication records, in addition to data from ancillary sources such as laboratory, pharmacy and radiology services (National Institutes of Health (NIH), 2006). All such clinical data represent the current or previous

health status of patients, while non-clinical data applies to administrative material such as their bills (Marin, 2007).

Luo (2006) argues that an EPR is not an electronic version of the paper record, but more than this: it is part of a computer controlled system used to manage and deliver the data needed for patient care. This provides a complete view of patient data, supports clinical decisions, enters clinical orders, supports communication with other professionals and provides access to knowledge resources. In addition, it is integrated with other systems, such as pharmacy, laboratory, radiology, billing, scheduling and organisational management (Luo, 2006). This integration is very useful and distinguishes the EPR from the PPR, which is usually a standalone record.

The computer system can play a vital role in the medical records, where data is arranged for rapid and accurate transmission to fulfil knowledge needs. Moreover, the data in these records is available at anytime and anywhere, and they can be easily searched for specific data needed to support patient care and non-care duties (Ambinder, 2005). The data can also be transferable, transportable, typed, complete and standardized. The integration of the EPR with other useful tools, such as clinical physician order entry (CPOE), may reduce medical errors (Miller and Sim, 2004). For all these reasons, the use of EPRs may be expected to improve the quality of healthcare services.

It is believed that implementing EPR could reduce medical errors and consequently the mortality rate (Anderson, 2004), thus enhancing the quality of care provided to patients. According to Thompson and Brailer (2004), this can be accomplished by using standardised clinical pathways like CPOE and clinical decision support systems (CDSS), or other useful electronic reminders and alerts for some dangerous medical procedures. Bates (2000) notes that approximately 100,000 patients die every year in the USA as a result of avoidable medical errors in hospitals; this number exceeds the combined deaths from AIDS, breast cancer and vehicle accidents.

One type of medical error, the medication error, can be minimised by the application of EPRs (Lindenberg, 2009). Electronic systems have various advantages over paper-based ones in this regard. Warnings about the side effects of a medicine can be displayed on the screen and sent to the professionals caring for the patient, in addition to other

valuable data about medication profiles, contraindications or allergies, which can be simply searched for in an electronic database (Jones, 2008). All these steps can reduce the occurrence of medication errors.

To evaluate the use of electronic nursing documentation, a randomised controlled trial (RCT) was carried out in 60 patients' record to discover the effect of EPR on the time and quality of documentation (Ammenwerth et al., 2001). It was found that electronic documentation was more legible, more complete and of superior quality compared with paper documentation. This is consistent with a number of other studies (Larrabee et al., 2001, Mahler et al., 2007, Munyisia et al., 2011). It was also found that less time was required to complete EPRs than PPRs (Ammenwerth et al., 2001).

Several other studies have compared EPRs with PPRs. One reviewed both types and interviewed 25 general practitioners (GPs) employing EPRs and 28 GPs using PPRs (Hippisley-Cox et al., 2003). Superior results were found for the EPRs compared to the PPRs, in terms of what proportion were fully understandable (89.9% vs. 69.9%, $p=0.0001$) and fully legible (100% vs. 64.3%, $p<0.0001$). In another study, the superiority of EPRs over PPRs was observed for some clinical activities (Hertzum and Simonsen, 2008). Physicians noticed that during ward rounds and team conferences, the workload was reduced. For their part, nurses reported that in nursing handovers, fewer data items were missed and fewer messages needed to be conveyed after handover.

Furthermore, EPRs are not free of disadvantages. A study to assess the accuracy and completeness of 163 EPRs (Staroselsky et al., 2006) compared the information reported by patients with the documentation held in the EPRs on health maintenance tests such as screening for cervical cancer, breast cancer and osteoporosis, and on vaccination against influenza. Surprisingly, the findings showed that EPRs were often incomplete compared to the patient reports. However, generalisation from this study is questionable, because it was performed in only one urban clinic with a small, non-random sample and because the validation of the information reported by patients is not described in the study methodology.

The relationship between quality performance and EPRs was assessed in a cross-sectional study (Kazley and Ozcan, 2008). Quality was evaluated using ten indicators

regarding three clinical conditions: congestive heart failure, acute myocardial infarction and pneumonia. A positive significant relationship was identified between EPR use and only four of the ten indicators, leading the authors to conclude that there was insufficient evidence of a relationship between quality and the use of EPRs in hospitals. However, quality is a multi-featured and complex concept, of which the study failed to measure some aspects, such as patient satisfaction and long-term effects.

2.5.1 Electronic recording of PU data

The literature was searched thoroughly for studies of the application of the EPR concept to the recording of PU data and only two were located. These were written by the same authors in consecutive years: 2008 and 2009. This demonstrates the significance and importance of the present research, in that this topic is clearly under-researched.

The first of the two studies (Gunningberg et al., 2008) compared the accuracy in recording PU prevalence and prevention data before and after the implementation of EPRs. Patients (n=357) were inspected for PUs according to EPUAP methodology on one day in 2002 and their records were audited retrospectively for PU documentation. The results revealed that prevalence calculated by reviewing paper records was 14.3%, compared to 33.3% for the physical inspection. Four years later, the hospital implemented EPRs. The authors repeated the study in 343 patients and calculated that the prevalence from reviewing the EPRs was 20.7%, compared to 30% obtained by physical inspection. Thus, fewer than half of PU patients had PU data recorded in their PPRs, while two-thirds of those in the second part of the study had such data in their EPRs. Thus, the EPRs were more complete and accurate than PPRs. However, the preventive interventions were under-documented even in the EPRs: 51.6% of PU patients received interventions, only 7.9% of which were recorded in the EPRs. This means that while the accuracy in recording PU data improved with the adoption of EPRs, some deficiencies still existed in recording PU data. However, the inspection was conducted in one day, while the records were audited retrospectively, so in the case of grade one PU the recording was likely to be inaccurate, since grade one PUs develop and disappear rapidly.

In the second study (Gunningberg et al., 2009), the comprehensiveness and quality of nurses' documentation of PU data was compared through retrospectively reviewing the health records before and after the introduction of EPRs in a university hospital. The authors compared 59 PPRs that were identified as having PU notes with 71 EPRs having such notes. The results indicate that EPRs were more comprehensive than PPRs, more of the former containing notes on nursing history ($p=0.040$), nursing goals ($p<0.001$), nursing diagnoses ($p<0.001$), nursing outcomes ($p=0.016$), PU size ($p=0.004$), grade ($p<0.001$) and risk assessment ($p=0.002$). Although the experimental design was impossible to follow in this study, it could be more effective in evaluating the effect of EPR alone. Moreover, the follow-up time of the records varied and the study was conducted only one year after the introduction of EPRs.

To sum up, it is unclear whether the use of EPRs to record PU data offers advantages over PPRs. These two studies show that EPRs were more complete, accurate and comprehensive. There were deficiencies in recording some PU data, but these may be related to the fact that nurses in these studies were unfamiliar with such systems, in which case the quality of recording would be expected to improve with time. Therefore, further studies are required in this area. The present work has adopted a comprehensive approach to exploring the recording of PU data in both types of system, with the goal of identifying the advantages and disadvantages of each.

2.6 PAPER RECORDING SYSTEMS

PPRs typically consist of numerous sheets of paper loosely bound together. These comprise individual records of several types containing differing amounts of data (NIH, 2006). The wide range of documents found in paper records include nurses' worksheets, patient charts, pieces of paper in doctors' and nurses' pockets, patient profiles in the pharmacy department, the forms that appear at the end of a patient's bed, physiotherapists' notebooks and even the 'nil by mouth' sign at the head of the bed (Fitzpatrick, 2000). The patient's condition sometimes seems to play a role in the size of the PPR, whereby patients with chronic problems are likely to have bulging files (Liaw et al., 1998). This large amount of varied data present in different places makes it

difficult to deal with, while in EPRs the medical record can be accessed swiftly via a computer and all types of data are organized and legible (Munyisia et al., 2011).

The familiarity of PPRs and the relative ease of scanning and examining them are major advantages cited for paper records (Tange, 1995). However, a range of problems are associated with their use in practice, including their format, content and physical structure. A poorly organised PPR can result in the wasting of professionals' time. Regarding the content, data is often illegible, missing or inaccurate. The physical nature of PPRs makes their availability location-dependent and complicates the retrieval of data (Tange, 1995). Furthermore, PPRs comprise original patient documents of which only one copy exists (Englebardt and Nelson, 2002), so that if they are lost, no data will be available on the patients concerned. These problems cause clinicians to spend time in collecting and generating data (Salmons, 2000). They will often face difficulty in reading and understanding illegible handwritten records and in dealing with the unavailability of some records.

Van der Lei et al. (1999) believe that the application of EPRs in practice is the best way to overcome all these disadvantages and to enhance the quality and effectiveness of the care provided. According to Chandra and Paul (2004), paper records cannot deal with the complexity of care environments present in current healthcare systems, while Ginneken (2002) suggests that they are unable to support professionals in their duty of delivering patient care in a proficient manner. Moreover, it is well documented by Korpman (1990) that PPRs are a poor tool for care delivery, while Luo (2006) argues that using only PPRs does not make sense in today's practice.

2.7 UTILISATION OF CLINICAL DATA

Utilisation of data refers to the presentation and analysis of data to assist in making decisions for clinical or administrative goals (Millar et al., 2009). Arguably, the clinical data that is stored in or obtained from recording systems can be used for differing aims by various actors in a healthcare system (World Health Organisation (WHO), 2008). It can be used by healthcare providers to support patient care, where a high quality of care

can be facilitated by good record keeping practice (WHO, 2008). In addition to the use of patient data at the clinical level, it can be used by managers (Millar et al., 2009) to enhance effectiveness and efficiency, by healthcare planners to make more effective decisions and by policy makers to prioritise and distribute resources (WHO, 2008). The utilization of such data can be categorised into two major types: primary and secondary uses.

Primary uses are to support direct patient care, to guide and record the clinical care given by professionals (Teasdale et al., 2007). Millar et al. (2009) define the primary use of data as referring to data recorded about the patient throughout the treatment period by a social care or health professional, as a component of the healthcare process. This clinical material is rich in descriptive data (physicians' notes, nurses' notes, etc) and in objective data (vital signs, lab test results, etc). It has the ability to convey a clear picture of the patient's condition and thus to enhance the quality of care (Elkin et al., 2010).

In addition to these primary uses of the data in direct patient care, there are many secondary uses, including healthcare planning, clinical audits, commissioning, performance improvement, benchmarking, research and clinical governance (Millar et al., 2009). Teasdale et al. (2007) note other secondary uses for clinical data, represented by the use of national screening and preventive campaigns, the planning of future services, national statistics and the allocation of resources.

Elkin et al. (2010) assert that clinical data has various uses in practice and is essential for continuity of care. Indeed, utilising PU patients' data can help nurses to have a clear idea of the size of the problem in their settings, the level of risk to patients, the severity of ulcers for those patients who have them and the local prevention plan, as explained in the following paragraphs.

The epidemiological data on prevalence and incidence is one of the major types that clinicians record and can be utilised in clinical practice. It is widely reported in the literature that it can be used either to evaluate a prevention programme or to assess whether the prevention provided is adequate. Prevalence data can be used for the latter purpose, to determine resource requirements and to assist in the planning and allocation

of these resources (Gallagher et al., 2008, Baharestani et al., 2009), while incidence data is commonly used to monitor the effectiveness of preventive nursing strategies in reducing hospital-acquired PUs (Gallagher, 1997, Whittington et al., 2000, Fletcher, 2001).

Risk assessment data is another important type that should be utilised in practice, as prevention may depend on it. Prevention cannot be provided to a patient unless it is known that he or she is at risk of PUs and thus in need of prevention. National Institute of Clinical Excellence (NICE) guidelines (2005) on prevention suggest the use of risk assessment data in practice. They recommend that any patient whose risk assessment data reveals that he is vulnerable to PUs should at least be nursed on a foam mattress with high specifications that has the property of relieving the pressure. This illustrates an important use of risk assessment data.

The same applies to data representing the severity of PUs, as the prevention provided to a patient based on data indicating that his PU is grade one will be quite different from that provided to a patient with a grade four ulcer. This data thus enables clinicians to choose the most appropriate treatment method. NICE (2005) and the Royal College of Nursing (RCN) (2005) refer to using grade data to decide on the prevention to be provided. They confirm that if a patient's grading data indicates that his PU is grade 1-2, he should be placed on a foam mattress or cushion with pressure-reducing properties and subjected to close observation of skin condition and a recorded repositioning schedule. On the other hand, if the patient's data reveals that he has a grade 3-4 PU, then he should be placed on an alternating pressure mattress (replacement or overlay) or a sophisticated continuous low pressure system; for example, a low air loss, air fluidised or viscous fluid system. Thus, it is clear how this data can be utilised in clinical practice. According to Lepisto et al. (2001), there are many other potential uses of grading data, which permits an understanding of the progress and diagnosis of a PU. It can be used to evaluate the healing of a specific ulcer and to assess the efficiency of intervention. Defloor and Schoonhoven (2004) add that this data facilitates the accurate description of an ulcer and its communication between caregivers, in addition to enabling comparison of the results of different audits.

PU data, being a type of clinical data, is obviously used at the clinical level in healthcare settings. PU patients receive prevention based on data recording their risk status and ulcer severity. The administrative uses of PU data are unclear at this level, since no report has been found of a study into the use of PU data in practice. Thus, the present research is intended to fill this gap.

The accuracy of PU data is a vital requirement in addressing the PU problem, the size of which in any facility cannot be calculated without accurate data (Kiernan, 1997). Moreover, the allocation of appropriate interventions and calculating the costs of prevention and management both depend on the existence of such data and its accuracy (Benbow, 2004). Thus, an accurate means of recording PU data is a crucial element in minimising the scale of the problem. The idea of the current research emerged from this perspective, given the need to analyse the available recording systems for PU data, in order to explain and explore microscopically what has been seen.

The recording and utilising of clinical data in general and PU data in particular have been explored in this section. The following sections of this chapter are concerned more directly with the PU data itself, reporting the results of a review of the literature regarding PU prevalence, in addition to risk assessment, ulcer severity grading and preventive strategies.

2.8 PREVALENCE DATA

Prevalence and incidence are types of epidemiological study, used to determine the size of a specific problem. In fact, there are many definitions of PU prevalence and incidence. The definition of prevalence used for the purpose of this study is the EPUAP one, since its methodology was followed in conducting the prevalence survey in Jordan. It defines PU prevalence as the number of patients *with a PU* as a proportion of the entire patient population at a defined *point in time* (Clark et al., 2002). It differs from incidence, which is the number of patients *developing* a specific disease or condition (e.g. PU) as a proportion of a particular population, measured over a *period of time* (Defloor et al., 2005b).

Thus, prevalence rate (n) can be calculated using the following formula and reported as a percentage:

$$\frac{[\text{Number of patients with PUs}]}{[\text{Total number of surveyed patients}]} \times 100\% = n\%$$

To put it simply, prevalence does not differentiate between hospital-acquired PUs and those existing when the patient was admitted to hospital (Defloor et al., 2002), whereas incidence measures only those ulcers developed in the facility concerned. An additional shortcoming of prevalence studies is that they provide only a snapshot of the situation in a given facility. Nevertheless, and despite the superiority of incidence studies in measuring the quality of healthcare (Gallagher, 1997, Whittington et al., 2000, Fletcher, 2001), it was decided to use a prevalence study as part of the current research, because it was seen as a valuable option with the benefit of helping to assess the magnitude of the problem in order to establish efficient healthcare plans (Gallagher et al., 2008, Baharestani et al., 2009). Moreover, incidence studies are usually more expensive to perform (Baharestani et al., 2009). Thus, the prevalence study was chosen for budgetary and practical reasons.

Cross-sectional designs are traditionally used when conducting PU prevalence surveys. There are two type of prevalence: point prevalence (defined above) and period prevalence, which is defined as the number of patients with PUs during a particular period of time divided by the number of patients in the eligible population during that period (Margolis et al., 2002). Thus, it is measured over a period of time, while point prevalence is measured at a specific point in time. Of the two designs, point prevalence is the more common in PU frequency studies (Stausberg et al., 2005).

Many prevalence studies have been conducted around the world, but there has been a lack of methodological standardisation, making it impossible to compare their reported results meaningfully. Indeed, there is great variation in PU prevalence rates reported in the literature and a critical review reveals many explanations for this. First, there are no agreed definitions of PUs, prevalence or incidence. Secondly, the settings and populations studied vary; the prevalence rate calculated for patients in a hospital with

tertiary care facilities cannot be compared with that obtained from a study of long-term care residents. Similarly, prevalence rates collected from critically ill and orthopaedic patients are not comparable with those for the general population. There are also differences in data collection procedures and study methodology; data obtained from retrospectively reviewing patient records is not the same as that obtained by direct physical examination. Another factor is the inclusion or exclusion of grade one PUs, which could influence the rate considerably. The accuracy of data is also weakened by the underreporting of PU cases, when the prevalence rate depends on the nurses reporting the cases. Finally, there may be many technical differences among studies, such as in sample size and in the grading and RASs used. All these factors will potentially affect the results (EPUAP, 2000, Fletcher, 2001, Baharestani et al., 2009).

To minimize these shortcomings and to enable researchers to analyse their data and compare it with that collected in other studies, a standard methodology with a reliable, uniform and precise measure of prevalence rate should be adopted. One such standard has been suggested by the EPUAP and this was followed in the prevalence survey conducted in Jordan and reported in the current thesis. In a study conducted in five European countries (Vanderwee et al., 2007a), the EPUAP established a methodology to be adopted as the gold standard for prevalence studies. Two trained nurses assessed 5,947 patients in 25 hospitals in five European countries: Belgium, Italy, Portugal, the UK and Sweden. They found that overall prevalence (grade 1–4) was 18.1% (Belgium 21.1%, Italy 8.3%, Portugal 12.5%, UK 21.9% and Sweden 23%). If grade one is excluded, the figure is 10.5%. A weakness of the study was that it did not recruit a representative sample of European hospital sites, because participation was voluntary and not randomised.

The literature was critically reviewed regarding PU prevalence for the purpose of the present research. Many indicators were analysed, including the methods used, settings, populations and the countries where they took place. All of these studies are summarised in Appendix A3.

Many prevalence studies have been conducted worldwide using the EPUAP methodology (Bours et al., 2002, Gunningberg, 2004, Gunningberg, 2005, Gunningberg, 2006, Schoonhoven et al., 2007, Gallagher et al., 2008, Wann-Hansson et

al., 2008) or other methods, such as the NPAUP guidelines (Pearson et al., 2000, Whittington et al., 2000, NPAUP, 2001, Whittington and Briones, 2004, Woodbury and Houghton, 2004, Chan et al., 2005, Lahmann et al., 2006b, Whittington and Briones, 2006, Uzun and Tan, 2007, Vangilder et al., 2008, Cardoso et al., 2010). Other studies were conducted retrospectively, the researchers depending on patient records as a source of data to calculate the prevalence rate (Schue and Langemo, 1999, Horn et al., 2004, Stausberg et al., 2005, Srinivasaiah et al., 2007, Sanada et al., 2008, Hendrichova et al., 2010, Amir et al., 2011). The problem with this approach to data collection is that there is no direct observation or physical examination of the patients, so that the researcher will be unaware of some cases which nurses have failed to record; as has been shown, medical records do not constitute a valid source of clinical data in general and PU data specifically. Other studies have depended on the nurses to report the data by completing questionnaires after assessing patients (Thoroddsen, 1999, Lepisto et al., 2001, Casimiro et al., 2002, Whittington and Briones, 2004, Chauhan et al., 2005, Lahmann et al., 2005, Barrois et al., 2008, Paquay et al., 2008, Shahin et al., 2008b, Tannen et al., 2008, Vangilder et al., 2008). The problem with this method is that the researcher will be uninformed about some cases if the participating nurses underreport them for any reason. One study was found to rely on two sources: a review of patient files and verbal feedback from the nurses caring for the patients (Srinivasaiah et al., 2007).

Prevalence studies may be conducted in different care settings, regardless of the method used. They have been conducted in acute care settings (Pearson et al., 2000, Tannen et al., 2004, Chauhan et al., 2005, Schoonhoven et al., 2007, Uzun and Tan, 2007, Gallagher et al., 2008, Wann-Hansson et al., 2008, Cardoso et al., 2010), in long-term care settings (Horn et al., 2004, Vangilder, 2006, Capon et al., 2007, Chacon et al., 2009, Lahmann et al., 2010) and in nursing homes (Casimiro et al., 2002, Paquay et al., 2008).

The review of the literature indicates that PUs tend to occur across the spectrum of healthcare settings and indicates the significance of the problem. In all the studies reviewed, the rate (calculated by various methods) was found to range from 1.8% in China (Zhao et al., 2010) to 59.3% in geriatric units in Sweden (Gunningberg, 2005).

The low prevalence rate in the Chinese study may be due to the inclusion of paediatric patients, since those are at low risk of PU (Vanderwee et al., 2007a).

A number of observations arise from a critical review of these studies. Regarding their methodology, it was found that the cross-sectional point prevalence survey was the most common design. It was also noted that superficial (grade one) ulcers represented the most common type in most of the studies, while the sacrum and heel were the most common sites of ulceration. Some studies had individual settings, including hospitals and nursing homes, while others were national studies measuring countrywide prevalence in different populations and settings (Bours et al., 2002, Woodbury and Houghton, 2004). Some studies compared settings in different countries; for example, Tannen et al. (2008) compared the prevalence in hospitals and nursing homes in Germany and the Netherlands.

Data collection was most often done by a team of researchers or the duty staff nurses. Many researchers provided training to the team in which they outlined the study aims and procedures, in order to ensure high inter-rater reliability (Pearson et al., 2000, Gunningberg, 2004, Lahmann et al., 2006a, Vanderwee et al., 2007a, Capon et al., 2007, Tannen et al., 2008, Zhao et al., 2010), while others provided no such training (Thoroddsen, 1999, Whittington et al., 2000, Lepisto et al., 2001, Casimiro et al., 2002, Chauhan et al., 2005, Barrois et al., 2008, Paquay et al., 2008). In these latter cases, there was a risk of underreporting, since the nurses who collected the data were not trained in how to record and report PUs.

Some studies have also collected data on elements of prevention (Bours et al., 2002, Gunningberg, 2004, Gunningberg, 2005, Vanderwee et al., 2007a, Tannen et al., 2008). The majority of patients with PUs or at risk did not receive appropriate preventive interventions (Gunningberg, 2005). These findings are in harmony with those of Bours et al. (2002), who found that only half of at-risk patients had been placed on a pressure reducing mattress, and with the finding of Vanderwee et al. (2007a) that only 9.7% of the patients judged as requiring prevention received adequate preventive care.

The generalisability of some studies is in question, especially where there were weaknesses in sampling. Some studies did not include all possible types of setting, so

that their samples were not representative of the population (Woodbury and Houghton, 2004, Gallagher et al., 2008, Paquay et al., 2008, Shahin et al., 2008b, Chacon et al., 2009). Others were conducted in one site only (Chauhan et al., 2005, Gunningberg, 2005, Uzun and Tan, 2007, Wann-Hansson et al., 2008, Hendrichova et al., 2010, Zhao et al., 2010). The sample size was relatively small in some studies; for example, Gunningberg (2004) used three settings, two of which had small samples (a general hospital, n=38 and a nursing home, n=45). Another example is the study by Chauhan et al. (2005), where 445 patients were recruited from one hospital in the whole of India. Participation in some studies was voluntary and not random, introducing the possibility of selection bias and invalidating the generalisation of the findings (Pearson et al., 2000, Gunningberg, 2004, Lahmann et al., 2005, Lahmann et al., 2006b, Schoonhoven et al., 2007, Vanderwee et al., 2007a, Tannen et al., 2008).

Other criticisms can be made of some of the reviewed studies. One included only patients at risk (Braden score <17) in its prevalence calculation, not the whole population (Horn et al., 2004). Other included only grade 2 PUs and above in calculating prevalence and incidence (Schoonhoven et al., 2007). Those studies using the Braden scale differed in the cut-off point chosen. One study (Cardoso et al., 2010) assessed only PU patients and those who had a mobility impairment, since a single researcher performed the assessment, so underreporting may have occurred. In one study the unconscious patients were excluded from calculating the prevalence in intensive care units (Shahin et al., 2008b), which could decrease the prevalence rate. Barrois et al. (2008) conducted a national prevalence study in all French hospitals, but university hospitals were excluded; these may have contained a large number of PU patients, thus affecting the prevalence rate obtained. Another national study had a bias in the data collection procedure, since organisations had to pay to participate (Bours et al., 2002). This may have affected the overall prevalence rate, since not all facilities participated.

Prevalence studies were also reviewed for the research sites. In the UK, 35 acute hospitals participated in a prevalence study over 6 years (O'Dea, 1999). All inpatients were assessed by two trained researchers in a single day each year. Prevalence was found to have fallen over the 6 years from 18.6% to 10% ($p < 0.0001$). The reason may

have been that the percentage of PU patients who had full care plans had increased from 52% to 66%. What is more, the proportion of patients whose ulcers were not recorded and documented at all fell from 21% to 17%.

In the European study, PU prevalence in the UK was found to be 21.9% (Vanderwee et al., 2007a). Other studies were conducted in mixed settings in the UK. Srinivasaiah et al. (2007) performed a point prevalence study to quantify the prevalence of wounds in general (surgical wounds, diabetics' leg and foot ulcers, cancer and PUs) in five acute and community English trusts. The data was collected by reviewing the patients' notes in 1,645 records and through verbal comments from the staff caring for them. The prevalence of all wounds was found to be 12% and PUs constituted 17.4% of these wounds (Srinivasaiah et al., 2007). The weakness of this study was that the wounds were not inspected by the researchers, due to lack of resources and time.

Another study, by Vowden and Vowden (2009), found that the prevalence of PUs within one urban English population was 0.74 people per 1000 (95% CI 0.6-0.8). This number contained tertiary referrals; if these were excluded from the calculation, the rate fell to 0.71 per 1000 population (Vowden and Vowden, 2009). As the population studied was that of only two primary care trusts (PCTs), it was not representative of the overall English community.

Prevalence and incidence figures in the Arab world are rare; only one PhD using data from Saudi Arabia was found, where the incidence was 22.9% (n=165) for grades one to four (Saleh, 2007). No study has been located in Jordan, which is the second site of this research. Therefore, such a study to measure PU prevalence in Jordan is necessary to show the country's decision makers the size of this important problem, allowing them to adopt appropriate strategies and apply prevention programmes to mitigate the problem.

2.9 GRADING DATA

PU grading tools are scales used to determine the level of PU damage (Bell, 2005). The accurate assessment and classification of PU grade is a very important step in planning the prevention and treatment of PUs, otherwise resources will be wasted. Several reasons are given in the literature for classifying PU patients with the accurate grade (Shiu-Ling, 2006). First, it will affect patients' outcomes, as the provision of suitable prevention and management to PU patients depends on the accuracy of the data. This is related to the second reason, which is that the cost of the resources allocated to PU patients will depend on their ulcer grade. Finally, this data is central to PU audits, so a high level of confidence in its accuracy is required.

The scale of severity of PU cases ranges from erythema of intact skin to the destruction of skin, subcutaneous fat, muscle and bone (Nixon et al., 2005). In current clinical practice, numerous PU GSs are employed to identify and classify the severity of tissue damage. Perhaps the most common ones are the NPUAP scale (NPUAP, 2007) (Appendix A4), the EPUAP scale (EPUAP, 1998) (Appendix A5), and the Stirling scale (Reid and Morison, 1994) (Appendix A6). The NPUAP and EPUAP scales use a four-grade classification system, ranging from non-blanching erythema to full tissue destruction, while the Stirling scale has five grades with subdivisions, varying from no damage to full tissue damage, descriptors being given for each stage (Reid and Morison, 1994).

The EPUAP grading system was produced by the EPUAP as a component of its PU treatment policy (EPUAP, 1998). In 2009, the EPUAP and NPUAP created joint prevention guidelines and attempted to formulate a common grading system to be used internationally. Under this new classification system, four grades are still used in Europe, while the NPUAP has two extra stages that are specified separately: the unstageable ulcer and deep tissue injury. Again, this difference makes comparison difficult across studies (EPUAP and NPUAP, 2009). In the past, the NPUAP used the term 'stage', while the EPUAP used the term 'grade'. In the new joint guidelines, they suggest using the word 'category' as a neutral replacement for these.

Most existing PU GSs have many drawbacks in practice. For example, a comprehensive assessment of wounds is missing from most of these tools, as is descriptive data regarding the wound, such as on the appearance of surrounding skin, tissue affected, odour, type of drainage and its characteristics. Further limitations of these scales are low inter-rater reliability (Reid and Morison, 1994) and vagueness in grading stage one; nurses frequently fail to recognise a grade one wound as a PU (Gunningberg et al., 2000).

The ambiguity in defining grade one arises from the debate over considering blanching erythema as a grade one PU. A continuing controversy about the description, clinical assessment and inclusion criteria of erythema has been identified (Bethell, 2003). When discussing the topic in more detail, some researchers assert that PU grade one is present when light finger pressure blanches the erythema, while others consider that a grade one ulcer is present when the erythema does not blanch. Healey (1996) compared 16 GSs and found just four (including Stirling, EPUAP and NPUAP) which had grade one as corresponding to non-blanching erythema. The last problem related to grading stage one PU is that it is difficult to identify these ulcers in patients with darkly pigmented skin (Shiu-Ling, 2006, Clark, 2010).

In light of these pitfalls in using PU GSs, there is a need for a standardised and structured method to measure the severity of PUs. NICE (2005) stresses that it is essential to enable professionals to take more informed decisions regarding the prevention and treatment of PUs, since these decisions should be based upon logical assessment and the application of knowledge of wound management.

For the purpose of this study, the EPUAP classification system was adopted and used in the prevalence survey, to ensure comparability with the EPUAP study, bearing in mind that no common GS has been adopted internationally (Harker, 2000) and that no particular system was already in use in Jordan. The reliability of the EPUAP scale is analysed in the next subsection.

2.9.1 EPUAP reliability

When reviewing the research on this topic, it is essential to analyse the reliability of the GSs, rather than their validity, because these tools are all constructed in a similar manner and may therefore be assumed to measure what they are supposed to measure, whereas it is necessary to determine whether different people using a particular tool will obtain the same results (Bell, 2005). This type of evaluation is concerned with inter-rater reliability, a measure of whether two or more independent raters will allocate identical grades to the same PU patient (Kottner et al., 2009a).

Two measures of inter-rater reliability are commonly employed. The first is the percentage of agreement, which measures the percentage of cases for which different raters agree on the same grade for the same patient (Ayello and Braden, 2002). The second is Cohen's Kappa (k), which is also a measure of agreement between two raters, but which considers the probability of obtaining agreement at random, where a k -value of 0.00 indicates the level of agreement that will occur as a result of chance, while $k = 1.00$ when there is complete agreement (Anthony, 1999). Generally, a kappa of 0.75-1.00 signifies excellent inter-rater agreement (Cassidy et al., 2002).

Several studies have investigated the reliability of EPUAP scale (Bours et al., 1999, Russell and Reynolds, 2001, Defloor and Schoonhoven, 2004, Pedley, 2004, Defloor et al., 2006, Beeckman et al., 2007). In these studies, the grading was performed either via photographs of PUs or by direct observation of patients. The problem with studies using photographs is that these provide only a two-dimensional and static picture of the wound. Several tissue layers cannot be visualised, as in the case of direct assessment of actual patients.

Defloor and Schoonhoven (2004) presented 56 PU photographs to 44 PU experts to assess and grade them according to the EPUAP classification system. The study found that the scale had a high inter-rater reliability, kappa being calculated as 0.8 ($p < 0.001$). The differences in grading between experts were limited to one grade. However, this research was conducted with PU experts, whereas in practice it would be done by ward nurses, who might have less experience, which could give less reliable results.

Moreover, the reliability of the scale in this study depended on the quality of the photographs, which could be poor, making classification difficult.

In another study, both the inter-rater and intra-rater reliability of EPUAP were measured (Defloor et al., 2006). The latter measures whether the same rater obtains the same results when using the same scale on the same patients at different times (Kottner et al., 2009a). In part one of the study, 56 PU photographs were shown to 473 nurses, who classified them into PUs (grades 1-4), normal skin, blanchable erythema, or incontinence lesions. Nurses were familiar with the EPUAP grading system and no further training was provided, resulting in low inter-rater reliability ($k=0.37$, $p<0.001$). Non-blanchable erythema was confused with incontinence lesions and blanchable erythema. In the second part of the study, 86 nurses assessed the same photographs on two occasions, with a one-month interval between the two assessments and with the photographs being presented in a different order. Intra-rater agreement was also low ($k=0.52$). The selection of nurses in both phases was unclear, so selection bias is possible.

Another 20 PU photographs were assessed by a large sample of 1,452 nurses from five European countries (Beeckman et al., 2007). The assessment of 12 EPUAP trustees was considered the gold standard. The nurses were familiar with the EPUAP classification. The study found that nurses graded PUs falsely and with a low level of agreement ($k=0.33$). Non-blanchable erythema was graded as blanchable erythema, while grade 3 PUs were assessed as grade 2. Moreover, it was difficult for the nurses to distinguish between moisture lesions and PUs. The apparent problem with this study was that the researchers used a convenience sample, weakening the generalisability of the findings.

In a study of actual patients, Pedley (2004) measured the percentage of agreement and Cohen's kappa for the EPUAP and Stirling scales. Two expert Registered Nurses made 35 observations of 30 patients. The results showed that the 2-digit Stirling scale was the favourite among the experts and that it gave the highest agreement ($k=0.457$). For the EPUAP scale, kappa was 0.308, with 48.28% of agreement. It would be inappropriate to compare the two scales, as one has four grades and the other five. The two tools were also compared in a study by Russell and Reynolds (2001), who found that the EPUAP

scale (percentage of agreement = 61.9%) was more reliable than the two-digit Stirling scale (percentage of agreement = 30.2%) when 200 nurses assessed 12 PU photographs.

In another study, by Bours et al. (1999), pairs of nurses classified the ulcers of 23 hospital patients and 45 nursing home residents using the EPUAP scale. Inter-rater reliability was found to be high ($k=0.81-0.97$), but the assessments were not performed independently. Reliability was much lower ($k=0.49$) when the pairs of evaluators assessed the PUs independently. There were two methodological weaknesses: it was unclear how many groups participated and whether training was provided prior to the study.

To sum up, high variation in inter-rater reliability has been reported for the EPUAP scale. Some of the reported reliability results were rather low, but this may be a function of the participants' knowledge of the scale, not of the scale itself. Pedley (2004) argues that GSs in general are susceptible to subjectivity and bias arising from users' clinical competence and knowledge. For example, in the study by Defloor and Schoonhoven (2004), high reliability ($k=0.8$, $p<0.001$) was reported for experts, while in another study by the same first author (Defloor et al., 2006), reliability was low ($k=0.37$, $p<0.001$) for nurses. It can be concluded that more training and experience in using this scale are needed in practice if reliable results are sought.

2.10 RISK ASSESSMENT DATA

RASs are screening tools used to assess patients' prospective risk of developing PUs (Bell, 2005). Accurate risk assessment of PU cases is essential in preventing PUs (Lepisto et al., 2001, Kottner and Dassen, 2008b) and is an indispensable element of any prevention guidelines or protocols. Without valid, reliable and accurate risk assessment practice, nurses may underestimate or overestimate patient's risk. Thus, it is the function of RASs to identify those patients who are at risk, so that appropriate and timely preventive nursing interventions can be offered. These preventive measures are costly and should be allocated only to those who are actually in need of them. Moreover, it has been claimed that using validated instruments for risk assessment

could facilitate nursing care and enhance communication among healthcare professionals (Gunningberg et al., 2001a).

Various RASs have been proposed to assess patients' risk of developing PUs. Approximately 40 RASs are available and new scales are being developed (Papanikolaou et al., 2007, Anthony et al., 2008). Perhaps the most broadly used are the Waterlow scale (Waterlow, 1985) in the UK and the Braden scale (Braden and Bergstrom, 1987) in the USA (Papanikolaou et al., 2007).

The Braden scale is based on Braden and Bergstrom's (1987) conceptual model and is composed of six subscales (Appendix A7), of which three relate to the intensity and duration of pressure (mobility, activity and sensory perception), while the remaining three are related to tissue tolerance of pressure (moisture, nutrition and friction/ shear). In fact, all six subscales are concerned with intrinsic or extrinsic factors that are believed to be crucial in the formation of PUs. Every subscale (excluding friction/shear, which has three levels) is rated from 1 (most impaired) to 4 (least impaired). Thus, the total score can be from 6 to 23. However, there is a threshold or critical cut-off score that divides the patients into those who may develop PUs and those who will not. It has been suggested that a score of 16 or less indicates the risk of a PU; Bergstrom et al. (1987) showed that at this point in hospitalised adults, sensitivity and specificity were 83%-100 and 64%-90 respectively. These are indicators of the scale's predictive validity.

The incontinence subscale of the Norton scale (1962) has been used in the current research as per EPUAP methodology. The Norton scale was the first RAS developed for PU and was used in a geriatric population in 1962 (Norton, 1962). It has five subscales (Appendix A8): mental status, incontinence, mobility, activity and physical condition. Every subscale is ranked from 1 (very bad) to 4 (very good) and total scores thus range from 5 to 20. The cut-off score is 14, lower scores signifying a higher risk of PU development. The tool has been tested predominantly in elderly care settings (Defloor and Grypdonck, 2005).

Concerns have been raised regarding the Norton scale; as some patients which it identified as not at risk have gone on to develop ulcers. Waterlow (1985) reviewed PU

risk factors and found that many were disregarded by the Norton scale. The Waterlow RAS (Appendix A9) was developed in response and is now widely used in the UK, Europe and around the world (Tolmie and Smith, 2002). It has 11 subscales (build/weight for height, continence, visual skin type, mobility, sex, age, appetite, tissue malnutrition, neurological deficit, major surgery/trauma and medication). The age and sex subscales have since been combined, leaving only 10 subscales, each of which has statements rated from 0 to 8 according to the degree of risk (0 = no risk; 8 = very high risk). The results for the subscales are summed to give the patient's final risk score. Each patient is then placed into one of three risk groups, depending on his or her total score: 10–14 = at risk; 15–19 = high risk; 20+ = very high risk. Among hospitalised patients, the sensitivity of the Waterlow scale has been measured at 89.5% and its specificity at 22.4% (Schoonhoven et al., 2002).

It is clear that no perfect scale exists in practice, since if there were an ideal one, there would not be 40 scales in existence (Anthony et al., 2008). The use of RASs over nearly five decades has failed to demonstrate clearly whether these scales can enhance patient care. Nevertheless, even if they do not strongly predict risk, they may be useful in identifying patients who need more awareness in terms of skin condition. These views, expressed by Anthony et al. (2008), are in line with those of Rycroft-Malone and McInnes (2000) and of Papanikolaou et al. (2003). Rycroft-Malone and McInnes (2000) consider that the capability of RASs to differentiate between different levels of risk is questionable, but that they can be used to alert staff to the presence of risk factors and to promote regular inspection of susceptible patients. Papanikolaou et al. (2003) argue that RASs indicate a tendency towards the development of PUs, rather than a strict prediction of risk, allowing preventive interventions to be initiated as soon as the risk is recognised.

The Braden scale has been selected for use in the present study, to obtain results comparable with those of the EPUAP study. The psychometric properties of this scale are analysed in the next subsection.

2.10.1 Reliability and validity of the Braden Scale

The psychometric properties of the Braden scale, including its reliability and validity, have been evaluated in several studies. The aspect of validity considered here is predictive validity, which is expressed in terms of sensitivity and specificity. Sensitivity is the proportion of patients who develop a PU after having been assessed as being at risk. Thus, to avoid under-prediction, the ideal tool would achieve a sensitivity score of 100% (Ayello and Braden, 2002). Specificity, conversely, is the fraction of patients who do not develop a PU after being assessed as not being at risk, so to avoid over-prediction and the wasting of resources, the ideal tool would achieve 100% specificity (Ayello and Braden, 2002).

In regard to the predictive validity of the Braden scale, Defloor and Grypdonck (2005) found a sensitivity of 79.8% to 83.1% and a specificity of 58.2% to 64.6% at the cut-off score of 17. The authors thus consider that the effectiveness of this RAS to predict the risk of PU is limited, causing pointless work to be performed and costly prevention supplied erroneously. At the same time, however, it was found to be superior to nurses' clinical judgement. Pancorbo-Hidalgo et al. (2006), in a systematic review paper, found that the Braden scale had the highest predictive capacity and validity, represented by the best sensitivity and specificity (57.1%, 67.5%) when compared with the Waterlow (82.4%, 27.4%) and Norton scales (46.8%, 61.8%).

Another cross-sectional study of 50 patients in acute settings was conducted to evaluate the scale's predictive validity (Capobianco and McDonald, 1996). The Braden score was calculated within 4 hours of admission, then three times per week and at discharge. The scale's predictive validity was found to be high: at the threshold point of 18, the sensitivity was 71% and specificity 83%. However, the sample size of this study was relatively small.

The reliability of the Braden scale has also been tested. A careful examination of the published data on Braden scale inter-rater reliability reveals the use of a mixture of statistical methods, including Cohen's kappa, percentage of agreement, Pearson's product moment correlation (r) and Intraclass Correlation Coefficient (ICC).

A systematic review indicates that 31 studies have examined the inter-rater reliability of the Braden scale (Kottner and Dassen, 2008a). Confirmed inter-rater reliability for the total Braden score using Pearson's r ranged from 0.80 (Ramundo, 1995) to 1.00 (Pang and Wong, 1998). In another review, Pancorbo-Hidalgo et al. (2006) report values of r ranging from 0.83 to 0.99. In a study by Defloor and Grypdonck (2005), Pearson's r was 0.97 ($p < 0.0001$). These studies show that the inter-rater reliability of the Braden scale is high using Pearson's r , which signifies the level and direction of association between two pairs of values. A value of $r = 1.00$ shows a perfect linear relationship between two evaluators. However, the r value can be 1.00 or close to this if a systematic difference or error exists between the two evaluators. Therefore, it cannot be relied on to measure the reliability of the overall Braden score (Kottner and Dassen, 2008a).

Choosing Cohen's kappa to assess reliability gives a total value ranging from 0.76 (Vanderwee et al., 2007b) to 0.91 (Vanderwee et al., 2007a). For sub-scores of the Braden scale, the k -values range from 0.50 (Bours et al., 1999) to 0.86 (Halfens et al., 2000).

The ICC was used in a study by Kottner and Dassen (2008b). Nurses assessed 152 residents from two German nursing homes twice using the Braden scale. The nurses were trained and had working experience ranging from 0.5 to 30 years. The findings were that for the total Braden score the ICC ranged from 0.73 to 0.95. For single sub-scores, it ranged from 0.06 to 0.97, with the lowest values for the sensory perception and nutrition subscales. No association between the level of inter-rater reliability and work experience was noted. Although the time interval between the two ratings was short (a few hours to 3 days), some changes in the PU risk may have occurred between them.

However, the ICC has some shortcomings as an inter-rater reliability measure. It measures the variation in scoring of the same rater as a proportion of the total variation of all scoring by all raters. Thus, if no variance exists between the raters, no significant ICC will be obtained. In other words, if the Braden scale is applied to a homogenous sample, a low ICC will result (Kottner and Dassen, 2008a).

Kottner et al. (2009b) conducted a study in home care settings to calculate inter-rater reliability. The data was collected during two Dutch national PU prevalence surveys in 2007 and 2008, when residents were assessed by trained nurses. A random sample of 352 and 339 residents in 2007 and 2008 respectively were assessed independently for a second time by qualified nurses. High reliability results were found. The ICC for the Braden scale was 0.90 in 2007 and 0.88 in 2008. However, the selection of residents in the second assessment was dependent on the study coordinator, which may have introduced selection bias. Furthermore, the nurses were aware that their assessments were to be repeated by qualified nurses, which may have affected their accuracy and precision.

The Braden scale's internal consistency was found to be good, with a Cronbach's alpha of 0.78 (Halfens et al., 2000). The authors speculate that removing the moisture and nutrition subscales and adding age as a risk factor could improve the scale's predictive validity.

To sum up, the studies reviewed indicate good levels of reliability and validity for the Braden scale. However, the different statistical methods used to assess the reliability of the scale make it difficult to compare studies directly.

2.11 PREVENTION DATA

PU's are avoidable, especially if evidence-based preventive measures are in place (EPUAP, 1998). The most important and commonly used preventive measures are special equipment and the repositioning of patients at regular intervals, intended to alleviate the factors that lead to ulceration: the intensity and duration of pressure (Vanderwee et al., 2005). Support surfaces are used to reduce the intensity of pressure, while repositioning reduces its duration (Defloor, 2000, Maklebust, 2004).

2.11.1 Support surfaces

Special support surfaces (such as beds, mattresses, cushions and overlays) are used to redistribute the interface pressure (Fletcher, 2006), which is the force between the

patient's body and the support surface. The body weight pushes against the surface of the bed or chair, exerting pressure on the skin and subcutaneous tissues (Reddy et al., 2006). Historically, support surfaces were classified as pressure reducing and pressure relieving.

However, in practice these terms now replaced by the term "pressure redistribution" (NPUAP, 2007), which is "the ability of a support surface to distribute load over the contact areas of human body" (NPUAP, 2007, p.2). In fact, that was related to the idea that a client cannot be weightless and so cannot be completely free of pressure, which make the term "pressure relieving" of no use. In the same direction, reducing the pressure over a bony prominence must be dependent on the other factor of the description: area. Either the area in contact with the support surface can be maximised, or contact can be temporarily removed or shifted to other areas, and in both situations the pressure redistributed rather than reduced.

There are several types of pressure redistributing device, like: non-powered or static surfaces and powered or dynamic surfaces (Fletcher, 2006). The former are stationary surfaces that require no electricity, designed simply to distribute pressure over a greater body surface (Reddy et al., 2006). Examples are fibre, foam, water, air, or gel-filled mattresses and overlays, or any combination of these (Thomas, 2001). Dynamic devices, by contrast, cause the pressure under the patient to fluctuate and therefore reduce the duration of pressure (Reddy et al., 2006). This can be done by using an electric air pump to inflate and deflate air cells in the mattress or overlay cyclically, promoting an even pressure distribution over the body surface (Thomas, 2001). Low air loss overlays and mattresses are further examples of dynamic devices that redistribute the interface pressure (Fletcher, 2006). Here, air-filled sacs support the patient by inflating at constant pressure, while sensors preserve a soft surface which distributes the patient's weight, therefore reducing local pressure (NICE, 2005).

More examples of the pressure redistributing surfaces include the pressure alternating systems and air-fluidized systems. The alternating devices work by inflation and deflation of the mattress cells in an alternating pattern. During cell inflation, the body will be in contact with the mattress and is exposed to high interface pressure, but this

will be for a short time; as the cycle progresses and the cell deflates, the pressure is partially or completely eliminated. As the cells inflate and deflate, the pressure will be redistributed at different parts of the body (Fletcher, 2006). Alternating devices also contain sensors that regulate the pressure inside the cells according to the patient's weight and weight distribution (Dini et al., 2006, Fletcher, 2006).

Air-fluidized systems continually change the supporting points of the body weight by constantly flowing warm air into fine ceramic beads covered by a permeable sheet. These beads are agitated and take the properties of a fluid, allowing the patient's body to float on the surface and redistribute the pressure (Maklebust, 2004).

As has been noted, surfaces and devices of several types are available for use in practice. The literature review located several studies showing no statistical significant difference among them (Russell et al., 2003, Vanderwee et al., 2005, Nixon et al., 2006), as discussed below.

A systematic analysis of the literature on alternating pressure air mattresses as PU preventive devices (Vanderwee et al., 2008) reviewed 35 studies. Many outcome measures were found to have been used to assess these devices effectiveness; incidence was used in 15 RCTs. Only one RCT compared an alternating pressure air mattress with the standard hospital mattress and found that the former was more effective in preventing PUs. Conflicting results were reported for RCTs that compared alternating pressure air mattresses with constant low air mattresses. Further RCTs are required in this area, taking into account that they should be large and of high quality, since all the RCTs included in this review had some methodological faults. For example, in some the statistical power that determined the sample size was deficient and not computed, while in others randomisation was insufficient and ambiguous. Finally, grade one PUs were considered in the outcome measures for some trials and not in others.

A year later a new systematic review paper was published (Wallace, 2009), but again, most of the studies included in the review – all of which were RCTs – were of poor quality. Weaknesses included small sample sizes, high attrition rates, no randomisation and a failure to define the type of alternating pressure device used. This review aimed to compare pressure relieving surfaces with standard mattress and to rate the different

types of pressure relieving surfaces in terms of reducing PU incidence. Fifty-two RCTs complied with the inclusion criteria and were included. The findings indicated that alternating mattresses reduced PU incidence more than standard surfaces. Of the eight RCTs that compared constant low pressure mattresses with standard ones, five demonstrated the superiority of the former. Another two RCTs confirmed that alternating pressure mattresses reduced PU more than standard mattresses. On the other hand, there was no evidence that one type of alternating or constant low pressure surface was superior to another: ten RCTs compared alternating pressure with constant low pressure devices and found no difference. Moreover, five RCTs compared different types of alternating pressure surface and none proved that one was better than another.

Obviously, the research on support surfaces has some uncertainties. It is not possible to assert that one kind of preventive surface is better than the others. As seen from the reviews discussed above, the research in this area is often not of adequate quality to enable clinical staff to make evidence-based decisions. High quality RCTs are required to raise the body of evidence. The RCTs discussed next, by contrast, could be considered of adequate methodological strength.

An RCT was conducted to assess whether using an alternating pressure air mattresses was as effective or more effective than standard prevention (Vanderwee et al., 2005). The trial included 447 patients from 19 internal, surgical and geriatric wards in seven Belgian hospitals. The inclusion criterion was that the patients were in need of prevention, as evidenced by their Braden scale score or the presence of a grade one PU. About half of the patients (n=222) were randomised into the experimental group (placed on an alternating mattress without receiving repositioning) and the other 225 into the control group (placed on a foam mattress with repositioning every 4 hours). No significant difference was found between the two groups in terms of PU (grades 2-4) incidence (15.6% and 15.3% respectively, $p=1$). It can be concluded that there is no difference in PU development between dynamic and static support surfaces. Methodologically, the trial was adequate: the sample size was calculated using power analysis, the dropout rate of the participants was low (21.6%) and randomisation was clear.

Another large RCT was conducted in eleven hospitals in six NHS trusts in the UK to compare alternating pressure mattresses with overlays in terms of PU incidence, healing of existing PUs and acceptability to the patient (Nixon et al., 2006). A total of 1972 patients were randomized into two groups: a mattress group (n=982) and an overlays group (n=990). The results revealed no difference in the incidence of PUs (10.3% and 10.7% respectively, $p=0.75$). Regarding the healing of ulcers, among the patients who developed PUs during the trial, 34% of those in the overlay group were healed, compared to 35% in the mattress group. The median time to heal was 20 days in both groups ($p=0.86$). However, patients were less satisfied with the overlay than the mattress: more patients (23.3%) lying on an overlay demanded to be changed than in the mattress group (18.9%). This was a high quality RCT where the inclusion and exclusion criteria were stated clearly, the sample was large, an a priori calculation of the sample was performed and the intervention provided was well documented.

Russell et al. (2003) conducted an RCT to compare foam with standard mattresses in PU prevention. Thus, 1169 patients from acute elderly, orthopaedics and rehabilitation wards, aged 65 and above, at risk of PU (Waterlow score 15-20) were assigned either to the foam mattress experimental group (n = 562) or to the standard mattress control group (n = 604). Patients received usual care and were observed daily for the formation of grade one PUs. No significant difference was found between the two groups in reducing grade one PU incidence. In this trial, information about the other grades (PU >1) was not given. While a non-significant difference was found, a larger RCT would be required to decide if this was genuine (Russell et al., 2003).

From all the studies reviewed here, it is notable that no significant differences were found between static and dynamic surfaces, between foam mattresses and standard mattresses, or even between mattresses and overlays in reducing PU incidence. This overall finding is supported by the joint prevention guidelines published by the EPUAP and NPUAP in 2009, which state that no evidence supports the superiority of foam mattresses over alternating mattresses (EPUAP and NPUAP, 2009). This leads to the conclusion that surfaces should be chosen with the consideration of cost and ease of use (Sharp et al., 2000). Crude figures from pressure redistributing mattresses'

manufactures revealed that the cost of acquirement of such mattresses is £50 to £80 million every year (Clark, 2005).

2.11.2 Repositioning

The repositioning of patients is an essential part of most PU prevention programmes and protocols. Performing repositioning at regular intervals decreases the duration of pressure and is thus thought to reduce the chance of developing PUs (Defloor et al., 2005a). Although it is a common practice, however, there is limited evidence regarding its effectiveness in preventing PU development. There is also disagreement over turning schedules. The various guidelines recommend different frequencies, usually based on experts' opinions. The Agency for Health Care Policy and Research (AHCPR) recommends repositioning at least every two hours (AHCPR, 1992), but its guidelines do not specify the mattress type to which this frequency applies. As for the new joint prevention guidelines, they do not specify actual repositioning intervals, but advise that they will depend on the patient's tissue tolerance, medical condition, skin condition, level of mobility and activity, on the support surface used and on the overall treatment objectives (EPUAP and NPUAP, 2009).

A systematic review evaluated the effectiveness of repositioning as a PU prevention measure (Krapfl and Gray, 2008). The authors used strict inclusion criteria that yielded only three studies: they should be RCTs or have a quasi-experimental design, studying repositioning as a preventive measure to decrease PU incidence. The review emphasises that inadequate evidence is available to support the present practice of repositioning and that turning patients every 4 hours on appropriate support surfaces is as effective as more frequent repositioning (every 2 hours). Furthermore, there is scant evidence that a 30° lateral position is better than 90° lateral and supine positions in reducing PU incidence. The three RCTs are examined in turn below.

In the first study, the influence of four different positioning schedules on PU incidence was examined in 838 geriatric patients in eleven long-term care institutions (Defloor et al., 2005a), all judged as in need of repositioning based on Braden or Norton scores. The patients were randomised into four groups and followed for four weeks to monitor the development of PUs. There were two control groups of patients (n=65 in each) who

received repositioning every 2 or 3 hours, on standard hospital mattresses. The other two experimental groups were repositioned every 4 or 6 hours, and placed on foam mattresses (n=67, 65 respectively). No difference in grade one PU incidence was found between the groups, while the incidence of grade two and above was significantly lower in the 4-hour group (3%, $p=0.001$), compared with other groups, where it varied between 14.3% and 24.1%. Thus, repositioning every 4 hours on a foam mattress can reduce the occurrence of PUs. It was also found to be a feasible method in terms of cost and effort. Among the controls, repositioning every 2 hours on a standard hospital mattress lowered PU incidence more than turning 3 hourly on the same mattress.

The weakness of this study is that it did not compare different turning intervals only, but combined these with different support surfaces, making it difficult to judge which interval is better in terms of reducing PU incidence. It is impossible to conclude that turning every 4 hours is better than 2-hourly based on this study, since the patients in these two groups were placed on different surfaces.

A second RCT evaluated the posture and frequency of turning of PU patients and their relationship to the development of ulcers (Vanderwee et al., 2007c). A total of 235 patients from 84 wards in 16 Belgian nursing homes with PU grade one were randomised into two groups. Those in the experimental group were repositioned every 2 hours in a lateral position and every 4 hours in a supine position on pressure reducing mattresses (n=122), while patients in the control group were turned every 4 hours, regardless of posture, on pressure reducing mattresses (n=113). The results showed no significant difference between the two groups in PU incidence ($p=0.40$). Moreover, for these ulcers, the location ($p=0.19$), the severity ($p=0.65$), and the time of development ($p=0.29$) were similar in the two groups.

It can be concluded from this study that more frequent repositioning cannot be considered a more effective preventive action. Relatively infrequent repositioning, such as 4-hourly, is likely to be more feasible in practice, to require less effort and to place a lesser burden on both the nurse and the patient. This applies only if the patient is placed on a pressure reducing mattress, however; patients lying on standard hospital mattresses will require more frequent repositioning. The study's strengths include clear randomisation, a sample size based on power analysis, clear intervention and high

interpreter reliability between the study nurse and nursing staff. Among its weaknesses are its relatively small sample size: the power analysis indicated that 295 patients should be recruited, but only 235 were actually included.

The third RCT examined the effectiveness of one form of positioning: the 30-degree tilt position, which can be performed by placing a pillow at an angle beneath one buttock, so that the pelvis will be tilted by 30°, while another pillow is placed under the two legs, thus raising the sacrum and heels from the bed surface. Young (2004) compared this position with the standard 90° lateral and supine positions in 46 patients in an acute care institution. The patients were elderly, at risk of PU (Waterlow score >10), free from ulcer at admission, able to lie in the 30° tilt position and agreed to participate. Half of the patients (n=23) were randomised into the experimental group (30° tilt position) and 23 into the control group (90° lateral and supine positions). The patients were assessed over one night by the researcher, noting any grade one PU development. The frequency of turning is not mentioned in the study. Moreover, 61% of patients in the experimental group and 58% of the control group repositioned themselves throughout the night. The results revealed that the 30° tilt position did not reduce the incidence of PU compared with the 90° lateral and supine positions (PU incidence 13%, 9% respectively, $p>0.05$). The study was found to have methodological restrictions: its small sample size (n=46) and the small number of patients who developed ulcers (n=3 in the experimental group and 2 in the control group) seriously weaken any conclusion from this study. Other weaknesses were a considerable dropout rate (31%), short period of follow-up (a single night), differences in repositioning frequency and the fact that more than half of patients in both groups repositioned themselves.

A more recent study with a different design supports these findings. This prospective cohort study examined the relationship between the frequency of repositioning and PU incidence in bed-fast elderly hip fracture patients in nine hospitals (Rich et al., 2011). A total of 269 patients were included, as they complied with the study criteria: age above 65 years, undergoing a hip fracture operation, bed-fast and free of ulcer at admission. The repositioning data was collected from the medical records. Trained research nurses assessed patients for the presence of PU grade 2 and above. The Braden scale was used to assess the patients' risk of developing PUs. These assessments continued every other

day up to 21 days. It was found that PU incidence was unaffected by whether repositioning was provided frequently (every two hours or 12 times a day) or not: 12% of all patients frequently repositioned developed PUs, compared with 10% of those repositioned less frequently (unadjusted IRR 1.22, CI 95% 0.65-2.30). Regarding the high-risk patients (Braden<14), no significant difference in PU incidence was noted between those frequently turned (6%) and those less frequently turned (13%) (adjusted IRR 0.39, CI 95% 0.08-1.84). This suggests that frequent positioning might not be efficient in preventing PUs, that the effectiveness of frequent turning as a PU preventive strategy remains uncertain and that more evidence is required. However, this was an observational study; large, high quality RCTs are needed to provide powerful evidence about the efficacy of repositioning. The sample was also relatively small and restricted to elderly hip fracture patients, which could limit the generalisability of the study. Moreover, the researchers relied on potentially inaccurate medical records to collect data on repositioning frequency; nurses may have provided repositioning without documenting it and vice versa.

2.12 THEORETICAL FRAMEWORK OF THE STUDY

Research is often guided by an explicit theoretical framework (Bowling, 2009, Creswell, 2009), determining what will be measured through the research questions and even specifying the methods of measuring study variables (Smith and Liehr, 2008). In the current research, the central concept being explored is PU data, collected and recorded by general nurses and TVNs, then used in various ways. The two main activities here are the recording of collected data and its subsequent use. A search of the literature showed that a framework dealing with such concepts is Nelson's data-to-wisdom continuum (Nelson, 2002), which has thus been selected as the theoretical framework for the current research. The continuum has data at the bottom of a hierarchy and wisdom at the top. The concept of wisdom here is equivalent to the concept of use in the current research; hence the suitability of the framework to guide the current work.

Historically, the Nelson continuum is based on the earlier use of the concepts of data, information and knowledge to explain the study of nursing informatics (Graves and

Corcoran, 1989). Nelson expanded this hierarchy to include wisdom in a continuum symbolized by a set of four sequential overlapping circles (Englehardt and Nelson, 2002) (Figure 2.2).

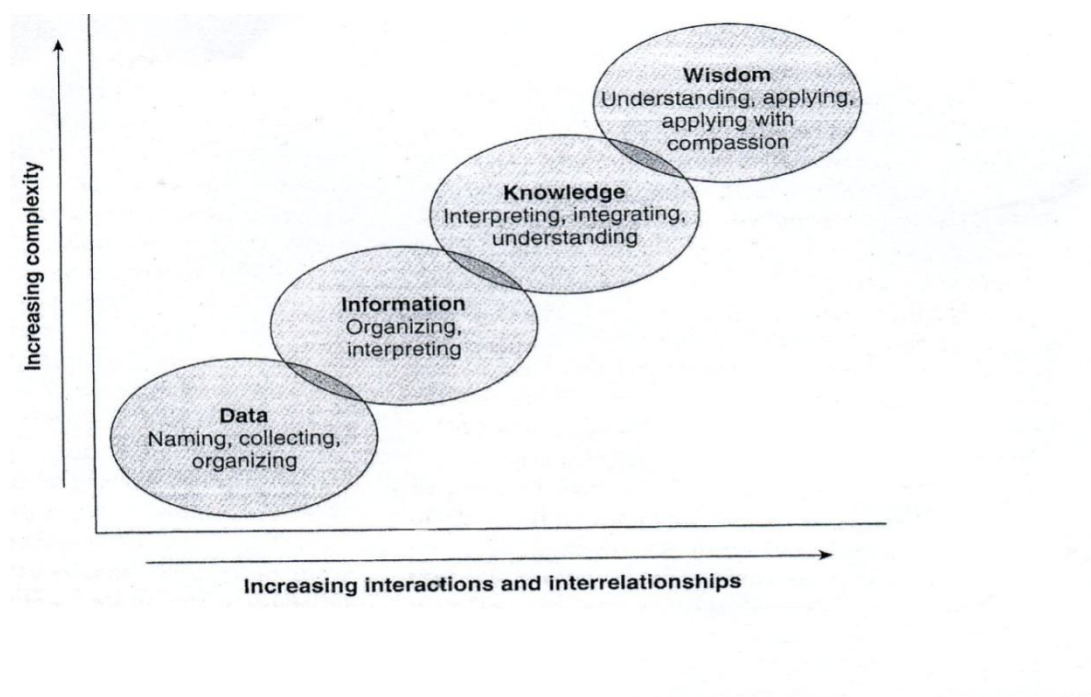


Figure 2.2 Nelson Data-to-Wisdom Continuum ¹

Nursing informatics plays a major role in organising clinical data, transforming it into information and knowledge that can be used to inform decisions about patient care. The most recent definition of nursing informatics by the American Nurses Association (ANA, 2008) incorporates the four elements of the continuum and states their importance for nursing care: nursing informatics is “a specialty that integrates nursing science, computer science, and information science to manage and communicate data, information, knowledge, and wisdom in nursing practice”. The fact that these four concepts are considered basic to the discipline of nursing informatics supports the use of the Nelson continuum as the theoretical framework of this research.

Briefly, within this framework, clinical data such as PU data constitutes raw facts recorded by the nurses in practice. When these facts are named, collected and organised,

¹ Englehardt and Nelson (2002). *Health Care Informatics: An Interdisciplinary Approach*, St. Louis, MO: Mosby. Figure 1-4, p.13.

data is transformed into information, which then becomes knowledge when the relationships between the facts are discovered. Finally, when the nurses understand and apply the knowledge in practice, the stage of wisdom will have been reached and the nurses will be able to manage patients' health problems. In the PU data example, nurses or TVNs can be said to have attained wisdom when they use knowledge based on patient data in practice to reach informed decisions with the potential to improve PU patient care, since wisdom is defined as the appropriate use of knowledge to manage human problems (Nelson, 2002). The following sections discuss each of the four concepts in turn, beginning with data.

- **Data**

Data comprises facts that can be measured or observed (Georgiou, 2002, Coiera, 2003). Georgiou (2002) and Bellinger et al. (2004) explain that this raw data is available in useable or unusable form. It may have no meaning in itself, or have several meanings (Schleyer and Beaudry, 2009). For example, the numbers 56, 87, 23 and 47 have no meaning as raw numbers, but can have multiple meanings if interpreted as identity numbers, ages, scores, etc. All data is related to facts and should be given attributes (Gudea, 2005). In the above example, if the raw numbers are given the attribute of patient's age, then they constitute data that refers to the ages of patients in a particular case. Age of 56 years means nothing if not combined with other data.

It is argued that processing is a central part of informatics, involving the transformation of data or information to a higher level with a more complex structure or meaning; thus, the processing of data will result in the generation of information (Graves and Corcoran, 1989). Indeed, no information can be formed without data, which must be organised to produce information (Ahsan and Shah, 2006).

In the Nelson continuum (Figure 2.2), data comprises raw elements or facts that are named, collected and organised into groups (Nelson, 2002). Thus, at the first level of the continuum, data is simply named and collected, corresponding in the above examples to the collection of numbers labelling them as patients' ages. When data is collected and named for several patients, it can then be organised into groups, such as patients' age data and patients' gender data.

- **Information**

Many consider that an essential element in producing information from raw data is meaning. When data receives meaning by means of some relational connection, it is transformed into information (Georgiou, 2002, Gudea, 2005). This meaning, which may be useful but need not be (Ackoff, 1989), is identified by the interpretation of existing knowledge (Bierly III et al., 2000). However, others argue that the simple organising and grouping of data can lead to information (Schleyer and Beaudry, 2009). A single datum is meaningless and cannot provide new information, while the grouping of data can do so (Coiera, 2003).

Alternatively, data is transformed into information when it is organised and interpreted (Nelson, 2002). Organising is an overlapping activity in the Nelson framework which can be used for producing data as well (Figure 2.2). This could explain the increased level of complexity (y-axis) and greater numbers of interactions and interrelationships (x-axis) as we move up in the continuum (Nelson, 2002). The organising of data can be done by grouping all related data together. The other activity at this stage is interpreting, by finding connections within the data. For instance, a patient's temperature of 38.6° C is meaningless as a single datum, but when combined with other data, such as a white blood cell count of 15,000 cell/mm³ (normal: 4,500-11,000 cell/mm³), it is transformed into the information that this patient may have an infection somewhere. Making sense of data means starting the process of gaining information, which involves structuring, shaping and processing data into a more useful product: information (Hey, 2004). In the above example, the temperature and WBC data is processed and structured to give a final product, which is the information that the patient is infected.

Next, the processing of the information itself may result in the development of knowledge (Graves and Corcoran, 1989), as explained below.

- **Knowledge**

Knowledge results from the gathering, accumulation and integration of numerous pieces of information (Ackoff, 1989, Hey, 2004). In other words, for information to become knowledge it must be put into context, interpreted or have meaning added to it (Ahsan and Shah, 2006).

As has been mentioned, moving up the continuum will increase the level of complexity. This means that knowledge is more complex than either information or data. The level of abstraction increases as data is collected to form information, which in turn is organised into knowledge (Bierly III et al., 2000).

Nelson (2002) specifies some activities that are essential to produce knowledge or transform information into knowledge, viz. integrating and understanding information, which occurs when patterns in the information start to emerge and the relationships between these patterns are specified. Many other authors have discussed the concept of understanding, claiming that it is a fundamental step in producing knowledge from information (Bierly III et al., 2000, Lindner, 2008).

Understanding comes from existing knowledge (Bellinger et al., 2004), which may be based on scientific data, coherent inferences, rules, laws, established patterns or methods (Targowski, 2005). It may also be based on experience obtained from different perspectives, which makes knowledge a dynamic phenomenon within the human mind, while information is static by nature, because it just a collection of data, on which experiences and the other factors mentioned above will have no effect (Clark, 2004).

- **Wisdom**

Nelson argues that wisdom will be reached when the application of knowledge occurs with the wisdom of understanding (Nelson, 2002). Thus, to reach the top of the hierarchy and produce a wise policy, decision or intervention, both knowledge and action are essential (Bierly III et al., 2000, Targowski, 2005). Having the prerequisite knowledge does not indicate that one has achieved wisdom, which is more than knowledge alone; knowledge informs one how to do things but cannot guarantee that it is done (Bierly III et al., 2000). Action, which is equivalent to the application of knowledge in the Nelson continuum, should provide such a guarantee.

Again, the concept of processing is important at this level, as clinicians, researchers and scholars process knowledge to generate decisions such as the diagnosis and management of clinical diseases (Graves and Corcoran, 1989). It is also important to note that understanding is an overlapping activity in the Nelson framework (Figure 2.2), since putting knowledge into practice requires an understanding of this knowledge in

first place. This is supported by the argument that the capability of transforming our understanding of knowledge into practice or action can lead to wise products (Bellinger et al., 2004).

As an end product, wisdom has many facets. In the healthcare field, the focus is always on patients and their care, but this is not the only benefit of achieving or using wisdom. Health data, information, knowledge and wisdom can support healthcare delivery for both receivers and providers of care, for administrators and for the whole healthcare organisation. This means that attaining wisdom could have benefits at all the levels mentioned (Englehardt and Nelson, 2002). In short, wisdom is used to solve or manage human problems (Nelson, 2002), to achieve and establish desired goals (Bierly III et al., 2000) and to produce wise policies and decisions (Hollander et al., 2010).

The use of knowledge allows one to attain wisdom (Nelson, 2002, Ahsan and Shah, 2006, Lindner, 2008). While Nelson (2002) argues that wisdom exists when there is appropriate use of knowledge, others contend that this happens when knowledge is used wisely and responsibly (Ahsan and Shah, 2006) or correctly (Lindner, 2008). Hence, the concept of use is an essential component of wisdom, so the continuum will not be complete if the data is converted to information and then to knowledge, but the knowledge is not used. The use of knowledge or of the understanding of information is equal to the concept of applying knowledge in the Nelson continuum, or the concept of action (Bierly III et al., 2000, Targowski, 2005). Thus, when the clinicians in the current research correctly used their knowledge based on PU data, they can be said to have demonstrated wisdom.

To sum up, the concepts of data, information, knowledge and wisdom overlap. This is demonstrated by the overlapping circles, as well as the overlapping activities included in the circles. Moving along the continuum increases the interaction and interrelationships between and within the circles, as well as the complexity of the elements within each circle. For example, the concept of wisdom is more complex than the concept of data (Nelson, 2002).

Some have argued that the distinctions among the concepts on the continuum are ambiguous (Blum, 1986, Clark, 2004, Gudea, 2005). However, although the activities

that define each concept overlap, there is activity in each phase which differentiates it from the other phases and these activities are present in each phase separately (Figure 2.2). Thus, the framework can be summarised in terms of these unique activities, as follows: data is about naming and collecting raw facts; when these facts are interpreted by grouping them together, information is produced; understanding the information will lead to knowledge, then applying this knowledge will lead to wisdom.

In fact, this framework has been applied in Schleyer and Beaudry's (2009) study, where its ideas are used to guide the practice of telephone triage nursing. When the triage nurse receives a call from a patient, she/he tries to collect data from the patient, swiftly organises and transforms it into information, and interprets it with experiential knowledge, thus reaching an appropriate nursing diagnosis and plan. Based on this, the wisdom will be attained and the nurse can provide safe care with reassurance and encouragement.

Similarly, this simple, linear framework provides the theoretical framework being used to guide the current research. Integrating the framework into the data collection methods and into the discussion of the main findings will be given. Applying the Nelson framework to the present research yields Figure 2.3:

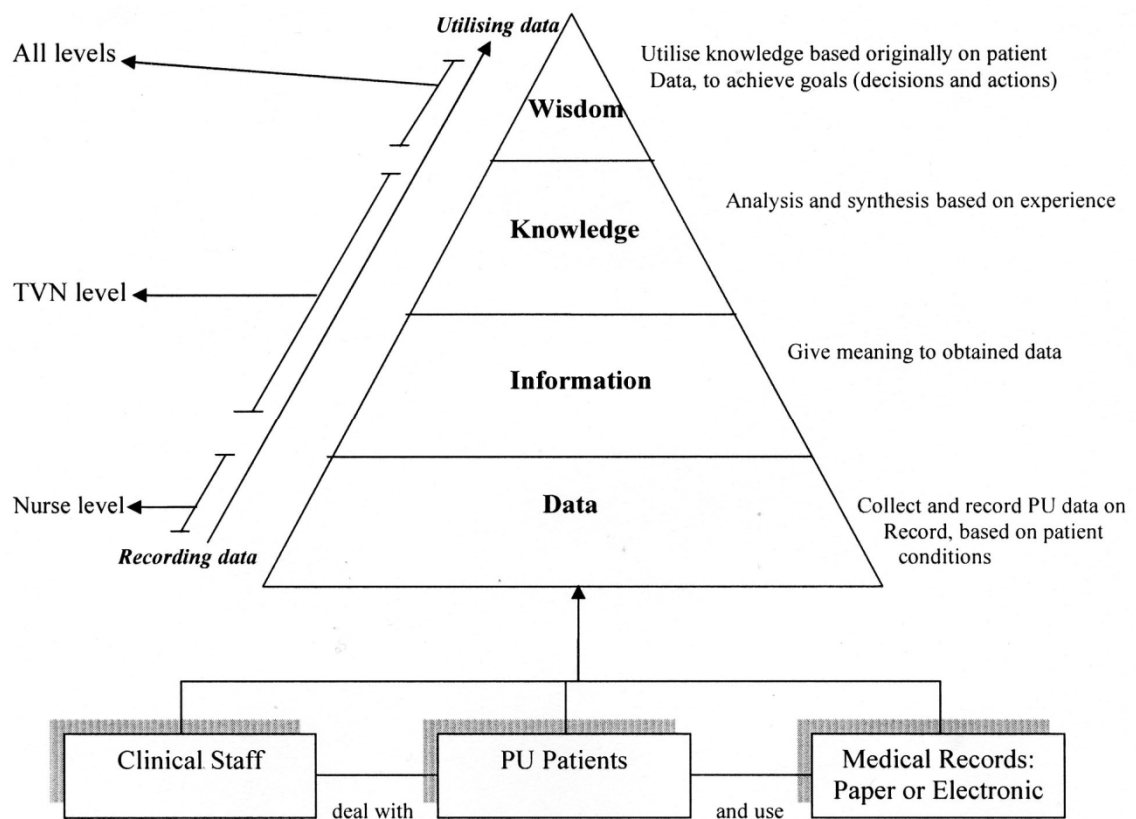


Figure 2.3 Nelson data-to-wisdom framework as applied to the current research

As seen in Figure 2.3, the first step in the pyramid is where nurses collect data about PU patients and record it in their records, either electronically or on paper. The data is then given meaning by the TVNs, who group it and interpret it to produce information about specific patients, wards or settings. Next, based on their experience, the TVNs analyse and synthesise this information to produce knowledge, which they use in turn to manifest their wisdom, in the form of managing a case, preventing a PU or any other appropriate action, as will be seen from the findings of the QUAL part of Study One.

It is clear that patient data is collected and recorded at the nurse level, while the TVN is the knowledge worker who transforms it into information and generates knowledge at his level. Applying this knowledge in practice can then occur at all levels of the organisation, as the results will show.

2.13 SUMMARY

While the critical review of the literature revealed a plethora of research into various elements of PU data, there is a gap in the area of recording and utilising such data in practice. PU data on matters such as prevalence, risk assessment, grading and prevention is collected by nurses and TVNs from patients and recorded in their medical records. This data represents the first circle in the Nelson continuum, which provides the theoretical framework of the current research. The TVNs transform this data into information and knowledge about PU patients, which is then applied in practice. Thus, TVNs make or recommend decisions based on this knowledge and so demonstrate their wisdom.

Patient records have many purposes and may be held on paper or in electronic form. The application of IT, including to EHRs, is believed to have a strongly positive effect on the quality of clinical data and consequently on patient health, but despite the many advantages cited in the literature, there are also disadvantages. One aim of the present research was to explore the recording of PU data and to investigate the advantages and disadvantages of these records. Another was the utilisation of PU data, despite the fact that no published studies have been located on this theme. Each single PU datum has its uses.

Reviewing the different elements of PU data revealed that many prevalence studies have been conducted around the world, with no standard method. The grading data revealed that several PU classification systems are available, while the reliability of EPUAP was explored in several studies. RASs have been used to determine the likelihood that patients will develop a PU. In spite of the drawbacks of these scales, they can be used to increase the awareness of staff about the possibility of a patient developing a PU. The psychometric properties of the Braden scale have been tested in many studies.

Two preventive measures were reviewed: support surfaces and repositioning. Many RCTs found no difference between static and dynamic surfaces or even between mattresses and overlays. The norm is to turn PU patients every 2 hours, but the studies reveal that placing patients on protective mattresses could reduce this frequencies to 4 hours, with the 2-hourly interval being needed only for patients lying on standard hospital mattresses.

This chapter shows that the literature has been reviewed adequately in the areas appropriate to this research. Each of the following chapters will be in two parts, each part covering one of the two studies. The next chapter identifies the methods used in each study.

CHAPTER THREE:

METHODOLOGY

3.1 A QUICK GUIDE TO THE CHAPTER

This chapter describes two studies. Study One was conducted in the UK to explore how PU data is recorded and utilised in practice. The mixed methods of a questionnaire and a semi-structured interview were used.

Although the two branches of the first study were related to each other, a distinction between them occurs at the tactical level. They are presented in two separate phases due to differences in timing, tools, data collection and analysis. A connection between the two methods will be made at the interpretation stage in the discussion chapter.

Study One is dealt with first. The mixed methods approach that was used is described and its use is justified. Then, the research questions and objectives of each method are presented and the advantages, disadvantages, validity and reliability of both methods are discussed. Another section of the chapter presents the tools used in Study One and discusses the design, development, content, testing, and actual use of the tools to collect the data. The study settings, populations and samples are also outlined. Finally, the ethical approvals of the study are discussed, and the plan for analysis offered.

Study Two was conducted in Jordan to quantify the prevalence of PU in Jordanian settings, as it was shown that this data was lacking from the previous literature review. The design and the research questions of Study Two are presented and the study settings, populations, and sample are discussed. In addition, the data collection tool's content is outlined and reasons in support of its validity and reliability are offered. The procedure employed to collect Study Two data is presented and the analysis plan given, after ethical approval for this study is demonstrated.

Study One Method (UK)

3.2 REFLECTION OF THE THEORETICAL FRAMEWORK ON THE STUDY METHODOLOGY

As mentioned earlier in the literature review chapter, the theoretical framework will guide the study, starting with the methodology. It plays a major role in two parts of the study methodology, the research questions and the data collection tools, and these parts construct the shape of the study.

The main research question of the study was based on the framework. The question concerned two concepts: PU data recording and the utilising of this data, with the idea that PU data itself should be known beforehand, and this was the job of the QUAN part of the study. The two concepts can be plotted in the framework that guides the study as illustrated in figure 2.3 in the framework section in the literature review chapter. Here, the collecting and recording of PU data is at the bottom of the pyramid, and the utilising of these data is the wisdom that is reached through utilising the PU knowledge, and this appears at the top of the pyramid. These elements in the research question and the title chosen for this study were based on the Nelson framework (Nelson, 2002).

The QUAN and QUAL instruments of this study were designed based on the theoretical framework as well. The questionnaire and part of the interview schedule provided the first phase in the continuum which was the data. The TVN then transformed this collected data into information and knowledge as the interviews showed. However, some parts of the interview schedule dealt with how the data were utilised in practice, and this represented the wisdom, which was the last phase in the continuum, as illustrated in section 2.12 of the previous chapter. Without adding this phase to the schedule, the framework would have been incomplete and the wisdom would not have been reached. So, we ensure that the wisdom can be measured if the knowledge based on the collected data has been used in practice.

3.3 MIXED METHODS

3.3.1 Mixed methods overview:

The mixed methods refer to combining QUAN and QUAL data collection and analysis to address a research question (Harris and Brown, 2010). Study One required a mixing approach to address the research questions and fulfil the research objectives. This combination of approaches is believed to generate data with a higher quality than if a single method was used alone (Creswell, 2009). Three factors are essential to consider during the mixing of research methods in a study. These are timing, weighting, and mixing (Creswell and Clark, 2007).

3.3.1.1 Timing

Regarding the time of mixing, concurrent and sequential approaches are available. The concurrent approach involves two independent methods which collect the data at approximately the same time (Creswell and Clark, 2007, Onwuegbuzie and Collins, 2007). In this case, two separate parts exist that use two different samples, aiming to address different research questions (Teddlie and Yu, 2007). In the sequential approach, the methods take place one following the other, and usually the last one is dependent on the first one (Bazeley, 2004).

The sequential method has been used in the current study, where the method and findings of the first phase inform the method employed in the second phase. Moreover, the QUAL method uses a subsample of the QUAN sample (Teddlie and Yu, 2007).

3.3.1.2 Weighting

Weighting refers to the priority or the relative importance of QUAN and QUAL methods in addressing research questions, implying that either one method will have greater significance than other, or both will be equally important. The research goals, objectives, questions and procedure will inform the decision as to how the methods are

weighted (Onwuegbuzie and Collins, 2007). In the current study, despite the fact that the QUAN data was collected and analysed first, equal weight has been given to each method, since both parts of the study have the same level of importance and priority in tackling the research problem.

3.3.1.3 Mixing

This refers to the mixing procedures of QUAN and QUAL methods. Three types of procedure have been determined (Creswell, 2009). The first procedure is merging, where both sets of data are collected and analysed separately, but mixing occurs in the interpretation of the findings when the two sets of results are merged together. The next approach is embedding; this happens at the design level, where one type of data is embedded within the design of the other data. Finally, in the connecting procedure, one set of data is collected and then analysed and based on the analysis of the first data set, the need for the other type of data emerges. Therefore, both data sets are connected and one method builds on the other. This final approach was followed in the present study.

3.3.2 Design of mixed methods research

Researchers can use any combination of the factors mentioned above in designing their mixed methods (Creswell and Clark, 2007). Three types of sequential designs have been identified (Creswell, 2009): The explanatory, where the QUAN method appears first; the exploratory, where the QUAL appears first; and the transformative, where the sequence is not important, but the design is theoretically directed. In the current study, the sequential explanatory design has been used (Figure 3.1):

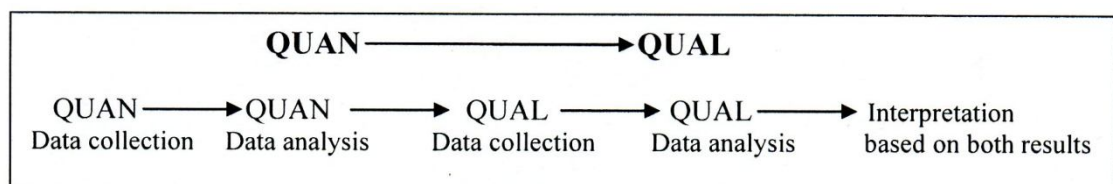


Figure 3.1 The sequential explanatory design of the study

3.3.2.1 Sequential Explanatory Design

The sequential explanatory design is a well known design for mixing methods, which consists of two distinct phases (Creswell, 2009). The researcher starts with the QUAN data collection and analysis and, subsequently, the QUAL data collection and analysis take places based on the initial QUAN findings (Creswell, 2009). Thus, the QUAL element explains and elaborates on the QUAN findings. The mixing occurs by connecting procedures, where the QUAN findings inform the QUAL data collection (Creswell and Clark, 2007).

This approach is useful when a QUAN phase produces unpredicted findings and, indeed, this is what happened many times during the current study. For example, a wide range of PU prevalence was reported for the community settings and, in this case, the collection of QUAL data represented by the interviews was used to explain this surprising finding. The main strength of this strategy is its straightforwardness (Creswell, 2009), since it is easy to apply clear and separate phases, and it is simple to report and describe their results. The length of time needed for such an approach, especially when equal weight is given to both methods, is the main challenge for conducting mixed methods in this manner (Creswell, 2009).

Figure 3.1 above illustrates the approach. Both methods were written in bold and in upper case letters to indicate that both methods have equal weight. The arrow refers to the sequential nature of the study (Onwuegbuzie and Collins, 2007). The findings of the two phases are presented separately in the results section and they are integrated during the interpretation phase in the discussion chapter (Bazeley, 2004), where both phases answer the same research questions.

3.3.3 Justification for using mixed methods

In general, the mixed methods approach can be used to increase the understanding of an area by extending our knowledge, verifying conclusions, or allowing us to begin to think in new way about a research area (Bazeley, 2004). Moreover, Harris and Brown (2010) found that confirmatory findings can be gained through methods mixing, regardless of the differences in collection methods, analysis and interpretation of data.

In the present study, the mixed methods approach was decided on for various reasons. Firstly, the QUAL phase was used to complement the QUAN phase (Polit and Beck, 2008). The interviews provide more in-depth and holistic information than the questionnaire could provide alone and help explain and elaborate on answers given in the questionnaire (Harris and Brown, 2010). This also helps justify the use of a sequential explanatory approach for mixing the methods. For a more practical understanding, the questionnaire can identify the prevalence rate of PU, clinicians who conduct the audits and the frequency at which audits are conducted, but it is unable to offer data about how audits are conducted, and this can be achieved by the QUAL part of the study (Figure 3.2). Therefore, it is believed that the questionnaires have confirmatory results, while the interviews have explanatory results (Harris and Brown, 2010). It was expected that the two different methods would help paint the same picture. The QUAN would give the black and white background of the picture, while QUAL would provide colour and brightness which would allow the picture to be seen from a distance.

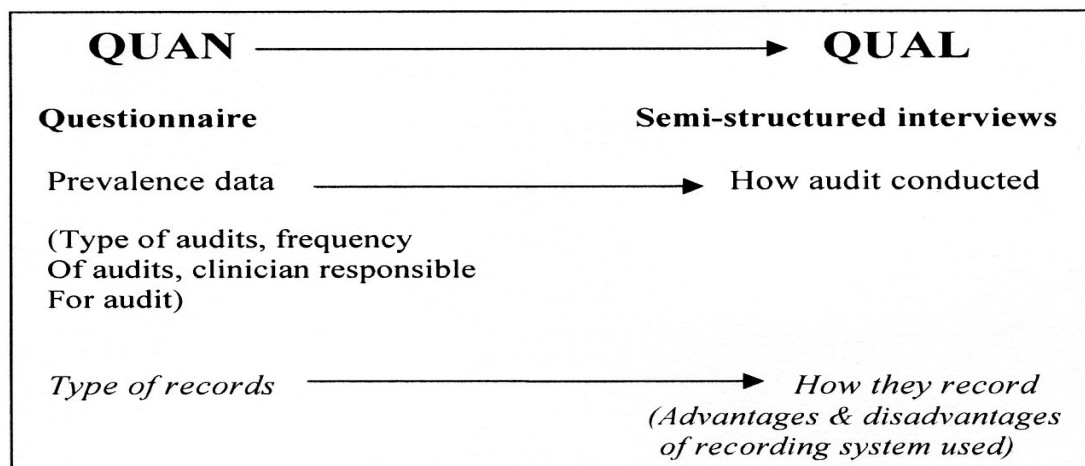


Figure 3.2 The complementary roles of the two phases of Study One

Secondly, the validity of the findings will be improved by using a mixed method (Teddle and Yu, 2007), contributing to the researcher's confidence about the results. Bazeley (2004) points out that employing a single method could make the study susceptible to validity threats, while mixing methods will compensate for any flaw in each individual approach.

Thirdly, the mixed approach is required to address all the research objectives and questions (Bazeley, 2004). Each individual method would be unable to answer all the research questions, since there are some which can only be answered by the QUAN phase, while others would be impossible to answer without the QUAL phase of the study.

3.4 RESEARCH QUESTIONS

How is PU data recorded and utilised in the clinical settings?

From this question, other related sub-questions can be derived, such as the following:

PU data (these questions were answered by the QUAN phase)

- What is the prevalence rate of PU in different care settings?
- What type of audits are conducted in clinical settings?
- How frequently are PU audits conducted?
- Who is the clinician responsible for conducting PU audits in different care settings?
- What is the most commonly used PU risk assessment tool in practice?
- What is the most commonly used PU grading scale in practice?
- What type of records are used to record PU data?

Data recording (these questions were answered by the QUAL phase)

- How are PU data recorded in different systems?
- What are the advantages and disadvantages of various PU data recording systems?
- How are PU audits conducted?
- How are PU cases reported and referred to TVNs?

Data utilising (these questions were answered by the QUAL phase)

- What are the uses of the recorded data?

PHASE I: QUAN METHOD OF STUDY ONE

3.5 QUESTIONNAIRE OBJECTIVES

- To determine the prevalence rate of PU in different settings.
- To find out about the type of audits conducted in clinical settings.
- To investigate how frequency audits are conducted in clinical settings.
- To determine who the clinicians responsible for PU auditing in clinical settings are.
- To determine the most commonly used RAS and GS in clinical settings.
- To discover the types of records used in clinical settings.

3.6 ADVANTAGES AND DISADVANTAGES OF QUESTIONNAIRES

The QUAN data for Study One was collected through a questionnaire. Many advantages of collecting data using questionnaires have been described. For example, the time, energy and costs for administering questionnaires are minimal (Wakley, 2005). Many also agree that the interviewer bias – or the fact that the interaction between the researcher and participants could influence the responses – is minimised because of the absence of a researcher (Parahoo, 2006, Polit and Beck, 2008). Furthermore, anonymity can be preserved in questionnaires, and this can enhance the response rate (Marshall, 2005).

Due to the constraints of time, money and manpower, a web based questionnaire option was adopted to collect the data for this phase of Study One. It was also determined to be the most appropriate and competent means of gathering data from the scattered population of TVNs around the UK. It seems that web based questionnaires are

becoming a promising method of involving participants concerned with a particular topic (Jones et al., 2008).

There are many benefits of using web based questionnaires, such as the fact that they can target large and geographically scattered populations, and collect huge amounts of data in a reasonable amount of time (Fricker and Schonlau, 2002). The cost is another advantage of such an approach since there is no need for paper copies, printing and postage (Jones et al., 2008). Moreover, the questionnaires can be filled in at the participants convenience (Lefever et al., 2006) and the responses can be sent easily by simply clicking the mouse or pressing the keyboard buttons, rather than requiring a trip to the post office to send the printed questionnaires (Lefever et al., 2006).

Despite the many advantages of questionnaires, disadvantages do exist as well. The incapability of the participants to elaborate their answers, or their inability to clarify their understanding of some questions is one of the most important disadvantages (Wakley, 2005). To overcome this problem in this part of the research, open ended questions were added when required and a text space was provided for most of the questions to enable the participants to attach any further comments. In addition, more detailed data was collected by the complementary QUAL part of Study One.

Another disadvantage of questionnaires is the low response rate (Bowling, 2009). Questionnaires need time and effort to be completed. In all kinds of research, a high response rate is necessary to diminish the non-response bias risk, or the fact that the non-responders could distort any obtainable conclusion (Marshall, 2005). Many actions have been taken to maximise the response rate as illustrated in section 3.13.

The web based questionnaires have some additional disadvantages. Deceptive participants could influence the quality of collected data, since the questionnaires are available online and anyone can fill them in (Wright, 2005). Therefore, there is less control over the sample. This problem was overcome in this study by adopting Lefever and co-workers' (2006) recommendation and communicating with the target population through an email mailing list. The link to the questionnaire was sent only to the target TVNs emails. Others could not access the questionnaire page without invitation.

Technical problems are one of the obstacles to web based questionnaires (Wright, 2005). Such problems could come from the service provider of the questionnaire's web page, or arise when the participants have limited computing skills. In addition, the participants may delete the questionnaire link from their emails as may be interpreted as junk mail (Lefever et al., 2006), or participants may have inactive, invalid, or several email addresses (Fricker and Schonlau, 2002). In this study, no technical problems were faced which related to the service provider, but we did come into contact with some inactive emails, which were removed from the list since this was the only way of contacting the respondents.

3.7 RELIABILITY AND VALIDITY OF THE QUESTIONNAIRE

Polit and Beck (2008, p.457) defined the validity of a research instrument as “the degree to which an instrument measures what it is supposed to measure”. Parahoo (2006) recommends two ways to evaluate a questionnaire's validity: the research questions should be answered and the different features of the problem being studied should be represented (Parahoo, 2006). These issues were taken into account at the questionnaire's development stage by undertaking a number of steps. Firstly, the questionnaire was designed based on the research objectives and questions. Then, the literature was consulted to ensure coverage of all different aspects of PU data. This was followed by informal discussions with some TVNs and colleagues and formal discussions with the supervisory team, until the final version was obtained. Other measures were also taken to reduce the threats to validity, such as anonymisation of the questionnaire, which is believed to have improved the responses' validity. Absence of the interviewer bias would minimise the threats to validity as well (Waltz et al., 1991).

Regarding reliability, Parahoo (2006) refer this to the consistency of the participants ability to respond and understand all of the questions in the questionnaire. This again can be guaranteed in two ways according to Parahoo (2006). First, the questions must be clear enough for participants to understand, and understand them in the same way as others. Second, the researcher must ensure that the directions will be interpreted in the same manner by all participants. Due to the standardised format of the questionnaire,

the same questions and instructions were encountered by all the participants in the present study, and this was thought to increase the questionnaire's reliability (Waltz et al., 1991). Before being sent to the TVNs, the final version of the questionnaire was piloted.

3.8 PILOT TESTING OF THE QUESTIONNAIRE

The pilot study is an essential step in studies that are based on questionnaires and can lead to their redesign or modification (Walonick, 2003). In the current study, the questionnaire was first sent to the School of Nursing in the researcher's university, where some of the staff are experts in the TV field, so that it could be evaluated before being sent to the actual respondents (TVNs). Responses addressing constructive points were gained from fourteen evaluators, and caused some amendments to be made, such as adding another choice to the answers for some questions, specifying whether the questionnaire was seeking data at the organisational or at the wards levels, giving examples for the answers that could be confusing, and reconsidering the wording to ensure better clarity and logical flow of questions. Following these comments some questionnaire items were modified.

The responses obtained from this pilot study proved that all the evaluators understood the questions and the instructions for filling in the questionnaire in the same way. This provides evidence of high reliability (Wakley, 2005). The relevancy and adequacy of the questions as indicated by the evaluators' annotations is evidence of good validity (Marshall, 2005). Moreover, the pilot testing allowed the researcher to judge the suitability of the questions' format to the targeted population, to evaluate the effect of the questionnaire length on the response rate, and finally to recognise any technical problems which could result from launching the questionnaire online.

3.9 STUDY SETTINGS AND POPULATIONS

This phase of the study depended on descriptive, cross sectional questionnaires which targeted the entire population of TVNs in the four countries of the UK. To make this possible, two settings were selected as suitable sources of participants: the TVS and the NHS, in which the TVNs registered as members in the former and those working within the latter were sought out.

TVNs are clinical nurse specialists who try to improve the quality of patients' wound care (Lowson, 2004). PU is one of the major interests of TVNs, which is why this group were chosen to complete the questionnaire. They have access to the specific information that the questionnaire aimed to acquire, such as on the prevalence rates of PU in different care settings. On the other hand, ward nurses may not have had data available to answer such questions, or may have only had data at ward level but not at organisational level.

This category of nurses exists in the UK and it is estimated that they number around 500 (Finnie, 2004). Austin's (2002) survey on TVNs found that they are employed in several settings: hospital settings (52%), community settings (19%), or combined settings (23%). Most of them have are very experienced, ranging from having 4-33 years experience, with an average of 20.8 years. Regarding their educational qualifications, 61% had obtained a bachelor degree and 26% had a master level qualification.

The TVS is possibly the oldest society in the world which addresses TV matters (TVS, 2009). It was formed in 1981, and it has more than 1000 members, most of whom are nurses, but various other health-related professionals such as doctors, pharmacists, podiatrists, scientists, etc are also represented (TVS, 2009). So, in this society the target population exist, since most of the members are TVNs or clinicians interested in wound care.

The NHS is a governmental organisation responsible for healthcare provision in all four UK countries. TVNs are one group of employees working for the NHS, which employs over 1.3 million people in total (Nicholson, 2010).

3.10 SAMPLING PROCEDURES

The sampling in QUAN research aims to accurately represent the population, and this requires a sample size that is capable of reflecting the population's characteristics as well as possible (Wunsch and Gades, 1986 cited in Teddlie and Yu, 2007, p.87). This is the reason why two organisations were approached. In both settings, the convenience sampling technique was used. The TVS was contacted via the professional adviser to the society who had access to the email mailing list of TVNs registered in the society, and was able to distribute the questionnaire to every TVN registered on the database on behalf of the researcher. In addition, an invitation was published on the TVS website containing a link to the questionnaire, in an attempt to achieve the highest possible participation.

Since a low response rate was obtained from the TVS (only 30 responses), a second setting was sought. After ethical approval was granted, it was therefore decided to send the questionnaire to TVNs working in the NHS all over the country. The procedure then followed is explained in the following paragraphs.

The researcher established a database containing all the UK NHS organisations' names and contact details. The email contacts were obtained from the organisations' websites. Following this, two further steps were taken. The first was to send an email to the organisations simply to enquire as to whether or not they had a TVN. If a negative response was obtained, the organisation's name was deleted from the researcher's database. In the case of a positive response, the second stage was enacted, as an attempt was made to obtain the contact email of the organisation's TVN. Since it is considered unethical to release such personal details, two strategies were followed. Either, a freedom of information request was made under the freedom of information act 2000 (FOI Act, 2000), so that the contact email could be released after the TVN's permission was obtained. In this situation, the TVN was contacted directly by the researcher. Alternatively, the second method was to send the participants information sheet (PIS) (Appendix B5) and invitation letter (Appendix B6) which contained the questionnaire link to the organisations' contact point who would forward the information to the

organisation's TVN on behalf of the researcher. In both cases, the completion of the questionnaire was taken as proof of consent.

To maximise the sample size, improve response rate, and generate a comprehensive picture of the situation over the whole of UK, all four countries in the UK were targeted in a survey which aimed to cover both primary and secondary NHS organisations.

- **England**

In England both the primary and secondary settings were targeted. Mental health trusts were, in the end, excluded after it was established from the responses that they do not have TV services. Instead, if the need for such a service emerges, they sign a service level agreement (SLA) with another organisation that does have such a service. For instance, they might employ the TVN of an acute trust, or the district nurse (DN) of a local PCT. Thus, 59 mental health trusts were excluded.

- *Acute trusts:*

These trusts are specialised regional or national centres which provide secondary health care for patients and include mainly hospitals. Some are connected to universities and are involved in training healthcare professionals (NHS England, 2010). There are 168 acute trusts in England (Table 3.1). 128 of these trusts have a TVN, 14 do not and 26 did not respond to the researcher's query after being contacted twice through all the contact points available on their websites. Therefore, it is unknown if they employ a TVN or not.

- *Primary care trusts (PCTs):*

It is community settings that provide primary care services to patients through any of the following: GP practices, health centres, DN services, nursing homes, home visits, and community hospitals, as well as dentists, pharmacists, opticians, NHS walk-in centres and even NHS Direct telephone services (NHS England, 2010). All of these services are directed by local PCTs. There are 148 PCTs in England, 70% of which state that they have a TVN (Table 3.1).

- **Wales**

There has recently been a restructuring of the NHS in Wales and since 1st October 2009, the country is served by seven local health boards. Each one is made up of a number of directorates, giving a total of 22 directorates (NHS Wales, 2010). The Directorates work jointly to accomplish the primary and secondary healthcare needs of the Welsh population (NHS Wales, 2010). Amongst the seven health boards, only one has no TVN (Table 3.1).

- **Scotland**

In Scotland, health services are delivered by fourteen regional NHS Boards. These Boards control the local NHS system performance in their areas, and certify that services are delivered efficiently. NHS Boards are accountable for the operation of the entire range of health services in a given area including hospitals and general practices (NHS Scotland, 2010).

- **Northern Ireland**

There are five trusts in Northern Ireland, delivering health and social care services to the Northern Irish public in acute and community settings (Health and social care in Northern Ireland, 2010). 80% of these organisations reported that they employed TVNs (Table 3.1).

Table 3.1 Numbers of TVNs in various UK settings

Country / Organisation	Have TVN N (%)	No TVN N (%)	No response N (%)
England: 168 Acute trusts	128 (76.2%)	14 (8.3%)	26 (15.5%)
England: 148 PCTs	104 (70.3%)	20 (13.5%)	24 (16.2%)
England: 59 Mental health trusts	0 (0%)	59 (100%)	-
Wales: 7 Health Boards	6 (85.7%)	1 (14.3%)	-
Scotland: 14 NHS Boards	10 (71.4%)	1 (7.1%)	3 (21.5%)
Northern Ireland: 5 Health & social care NHS trust	4 (80%)	-	1 (20%)
Total (401 trusts)	252 (62.8%)	95 (23.7%)	54 (13.5%)

The questionnaire was available online for more than six months. After that, to enable the beginning of the second phase of Study One, it was taken offline and no more responses were obtained. It was difficult to calculate the response rate for the questionnaire, since two sites had to be accessed to collect the data. Furthermore, the questionnaire was available online, so no one was prohibited from completing it. To the best of our knowledge, the first 30 responses came entirely from the TVS, and the remaining responses were from a mixture of NHS and TVS contacts, and possibly others.

3.11 QUESTIONNAIRE DEVELOPMENT

As mentioned earlier, the questionnaire was developed from four sources: a general review of the literature about different aspects of PU data; informal discussions with TVNs from both the acute and community settings; formal discussion with the research supervisory team; and, finally, expert opinion from staff in the researcher's university. The final questionnaire was comprised of ten questions contained on one page (Appendix C1). These questions were divided into two types. The first were closed ended question that could be answered by a number(s) or a word(s), and most of which were multiple choice questions. However, even these questions were accompanied by a text space where the respondents could provide extra information if they wished to do so. The second type of questions were the open ended questions which asked the respondent to give broader or more detailed information, but even these questions required minimal text. No subjective points of view were required and follow up interviews were carried out for more clarification of the response.

At the end of the questionnaire, the researcher's contact details were supplied to enable the participants to contact the researcher to arrange for an interview in which it was hoped that they may be able to elaborate more on their answers. Further, a space was provided if the respondents wished to leave their contact emails.

3.12 QUESTIONNAIRE DISTRIBUTION

TVNs received an invitation to participate via an email which contained a hyperlink leading to the questionnaire site. In addition, they were sent a PIS explaining the purposes of the study. The questionnaire was anonymous, which meant that neither the identity of the TVN nor the organisation in question was sought as was believed that maintaining confidentiality in this way would enhance the response rate. Participants' completion of the questionnaire was taken as their consent. A reminder letter was sent three weeks after the initial one, also via email. Due to the anonymity of the study, the reminding letter had to be sent again to the entire group but this time asked the TVNs who had filled in the questionnaire in the first round to ignore the email and encouraged those who had not to do so. The reminder was sent to those on the TVS email list by the professional adviser on the researcher's behalf. In the case of the NHS, if the researcher had the TVN's email, a reminder was sent to the TVN directly. Alternatively, if a contact point had been identified in the organisation to which the TVN was connected, it was contacted to request that a reminder be sent to the TVN.

3.13 OPTIMISING THE RESPONSE RATE

Various strategies were taken to improve the response rate, and these can be divided into four categories. The first group of strategies relates to the settings. In order to maximise the number of participants, two organisations, the TVS and the NHS, to which all TVNs belong, were approached. Moreover, all four countries in the UK were involved to expand the population in order to get a representative sample. Secondly, the design of the question was carefully considered. It was very short (one page), with simple, direct questions, most of which could be answered by one word or number. Moreover, it was decided to be made available online, where it could be completed more conveniently than by filling in a paper form which would have to be posted back. In addition, because the electronic version of the questionnaire was designed to fit on one page only, with all the sections appearing in front of the respondents at once, the

respondents could scroll up and down, without pressing next buttons, and this made it particularly quick and easy to complete.

Thirdly, a few strategies were employed which were connected to the respondents themselves. For instance, the respondents were assured in the invitations and the PIS that their responses were valuable and could help lead to a better understanding of the research topic. Furthermore, the anonymity of the respondents was also ensured by the fact that no identifiable data was sought, as this is believed to enhance the response rate (Marshall, 2005). The saliency of the research topic is believed to have a great influence on the response rate (McColl et al., 2001). In the present study, the research topic was assumed to be relevant to the TVNs, which may have encouraged them to fill the questionnaire in, especially as they were assured that they would be provided with a copy of the results. Fourthly, a number of procedural issues are also believed to have had an effect on participation. The first of these is the fact that a reminder was sent to encourage the TVNs to fill the questionnaire in since this is something which is advocated by experts in questionnaire design (McColl et al., 2001). Moreover, each organisation was contacted individually to establish whether or not they had TVNs, then to obtain the contact email of this TVN or at least their willingness to forward the questionnaire on behalf of the researcher. Building a researcher database played a great role in facilitating all these activities. Finally, it is believed that all these measures combined helped to enhance the participation of the respondents in the current study.

3.14 ETHICAL APPROVAL

Ethical approval for the whole of Study One came from two sources. The Ethics Committee of the Faculty of Health and Life Sciences at the researcher's university granted approval (Appendix B1), and NHS approval was obtained from a local Research Ethics Committee (Appendix B2).

The first phase of Study One started with the web-based questionnaire, as the TVNs were sent, by email, a letter inviting them to participate which contained a link to the questionnaire web page. This was sent along with the PIS which outlined the study's

aims and procedures. The subjects' willingness to fill in and return the questionnaire was taken as proof of consent. At the end of the questionnaire there was an invitation for those who were interested in taking part in a follow-up interview to contact the researcher to arrange this. Then, the second phase of Study One began as the interviews were conducted. Informed consent (Appendix B7) was obtained from all TVNs interviewed, who already had some knowledge of the study from the first phase. Confidentiality and anonymity was assured, with neither individuals nor organisations being identifiable in any form of the study output. Interviewees were also informed that they could stop the interview at any time without consequences. No tape recording was undertaken.

3.15 DATA ENTRY AND ANALYSIS

Data were entered into the Statistical Package for Social Science (SPSS) version 16 for Windows by the researcher (SPSS, 2007). Data consistency and quality was double checked by a PhD colleague research student. Analysis was performed in three stages. First, descriptive statistics were carried out on the questionnaire variables and, for this reason tables of frequencies and percentages were calculated. Second, content analysis was applied to the open ended questions to identify broad themes, especially for the questions which asked about prevalence rates, since many respondents did not provide this important data, but instead provided written justifications. Third, some inferential statistics were produced.

Different inferential statistical tests were performed, depending on the nature of data. The Kolmogorov-Smirnov Z test was used to decide whether the continuous variable "prevalence rate" was normally distributed or not. According to this test, a significant result ($p < 0.05$) shows that the sample distribution is significantly different from a normal distribution. However, if the test result was not significant ($p > 0.05$) this would mean that the sample distribution is not significantly different from the normal distribution (Field, 2009). The test was used in this study to check whether parametric or nonparametric tests should be used (Field, 2009). In our sample, the prevalence rate

was not normally distributed (Kolmogorov-Smirnov=0.105, df=121, p=0.002), so some non-parametric tests were used, as illustrated below.

The Pearson Chi-square test is a non-parametric test executed to explore the significance of the relationship between two categorical variables (Pallant, 2007). In this phase of the study, the chi-square test was used to explore the relationship between the categorical variable (type of organisation) and most of the other categorical variables in the questionnaire (such as methods of calculating prevalence rate, clinician responsible for PU audits in the organisations, the most commonly used RAS, type of records for PU data). However, the strength of the association between variables cannot be provided by this test (Pallant, 2007, Field, 2009).

The assumptions of Chi-square test can sometimes be violated, most clearly when not 80% of the expected frequencies are greater than 5 (Pallant, 2007). In these cases, the use of Fisher's exact test becomes necessary, especially when the sample size is small (Field, 2009). This test had to be used occasionally in our study, for example when comparing the different types of organisations and the frequency of conducting PU audits in these organisations.

The Kruskal Wallis test was used to compare the scores on not normally distributed continuous variables for three or more groups (Pallant, 2007). In this phase, it was used once; to compare the prevalence rate between the different healthcare organisations.

PHASE II: QUAL METHOD OF STUDY ONE

The second phase of this study involved conducting semi-structured interviews with TVNs who had also participated in the QUAN part of the research and had indicated that they were willing to be interviewed. The topics covered in the interviews were chosen based on the findings of the QUAN stage and in harmony with the research objectives and questions. Sixteen interviewees were interviewed from different settings. The aim of the interviews was to gather QUAL information about how PU data is recorded and utilised in the clinical settings. In other words, the interviews were employed to elaborate on some previous QUAN results and to serve a complementary role by tackling the remaining research questions which the QUAN phase was unable to address.

An interview is a data collection method in which the interviewer asks questions to an interviewee in order to gather information which may help to answer the research questions (Polit and Beck, 2008). Three types of interviews exist: structured, semi-structured, and unstructured (Bowling, 2009).

In structured interviews, predetermined questions are asked by the interviewer, as presented in the interview schedule, with the same exact sequence and wording being used for each interviewee. In contrast, the interviewer has slight control over the unstructured interview schedule and the question sequence may be changed according to interviewee responses (Watson et al., 2008). Semi-structured interviews can be placed in between these two types. They are flexible, and allow new questions to be added to the interview schedule, in contrast to the structured interview. At the same time, however, the interviewer does have an interview schedule to make use of, unlike in a completely unstructured interview (May, 2001). For this research, the semi-structured interview method was used for the following reasons. Firstly, the interviewees were specialist nurses who had a wide range of educational and work experience history and this variation precluded the use of a standardised method.

Secondly, this method was appropriate for exploring the experiences of the nurses regarding how PU data is collected, recorded and used. Thirdly, the approach permitted the researcher to probe for more information or clarification of interviewees' replies, which would not have been possible via a structured method. Fourthly, although the QUAN part raised many issues regarding the TVNs' experiences which were to need QUAL explanations, it was felt that the semi-structured interview method would be sufficient to explore these issues, taking into account that no personal opinions, beliefs or behaviours needed to be investigated, and therefore making the unstructured interview an inappropriate choice.

Interviews can be conducted either face to face or by telephone, and there are many advantages of both (Polit and Beck, 2008). In the current phase of the study, both types were used, but more telephone interviews were conducted due to the constraints of time, money and manpower, which are important resources of the research process and always need to be preserved, and especially in this case since the researcher is a sponsored student from his home university, where the research project has to be completed within a fixed time frame. However, telephone interviewing is an efficient technique for gathering both QUAN and QUAL data for nursing research, which can improve the data collection quality (Musselwhite et al., 2007), and can be used productively in QUAL research (Sturges and Hanrahan, 2004). It can also avoid the shortcomings of face to face interviews, where interviewees can be guarded, and may only articulate socially accepted answers in front of the interviewer (Wilson et al., 1998).

3.16 INTERVIEW OBJECTIVES

- To describe how PU data is recorded using different types of recording systems.
- To find out how PU cases are reported and referred to TVNs.
- To explore the uses of PU data.
- To describe how audit conducted in different care settings.
- To discover the advantages and disadvantages of different PU data recording systems.

3.17 ADVANTAGES AND DISADVANTAGES OF INTERVIEWS

The multiple uses of semi-structured interviews are an advantage of this method. They are appropriate for exploration of attitudes, beliefs, values, experience and motives (Barriball and While, 1994), and to explore in substantial depth some complex and sensitive issues (Parahoo, 2006). They were chosen here to explore the research topic in greater depth. Moreover, Barriball and While (1994) claimed that it can compare between interviewees' responses by ensuring that all questions have been answered by them.

Another important advantage of semi-structured interviews is that they facilitate probing. The use of probing can improve the reliability of data since the interviewer can elucidate concerns raised by interviewees, extract valuable and complete information and look for any discrepancies between responses (Barriball and While, 1994).

However, interviews in general are a time consuming method given the long process of arranging to conduct the interviews, administering them and, finally, analysing their content (Bowling, 2009). Polit and Beck (2006) also argue that using interviews as a data collection method is an expensive process and, what is more, they can preclude the

anonymity of the participants. Another disadvantage is the interviewer bias, which could affect the reliability of the data (Barriball and While, 1994).

3.18 RELIABILITY AND VALIDITY OF THE INTERVIEWS

The reliability of research tools can be determined by test-retest procedures (Waltz et al., 1991). Such a process is feasible with structured interview schedules, where the same schedule can be used on different occasions and then the data compared. However, this was not possible for the semi-structured interviews employed for this phase of the study, since the exact same schedule was not followed with all interviewees, and each one was approached according to individual conditions. Thus, it was difficult to measure the reliability of these interviews.

Valid interview data can be defined as “those that accurately describe what the investigator is attempting to study” (Hutchinson and Wilson, 1992, p.117). Evaluating the validity of interview data that provided by interviewees is not a simple task (Waltz et al., 1991), but all measures were taken in this study to diminish all threats to validity.

According to Hutchinson and Wilson (1992) interview validity can be affected by five factors. First, the interview questions should be relevant to the research objectives and arranged in order from general to specific. In the current interviews, many questions were extracted from the QUAN phase, and the remainder were designed to complement the QUAN questions, so the interview schedule was directly related to the aims of the project.

Second, the timing of interviews is an important consideration and appropriate time should be chosen by the researcher. In the present study, the TVNs received the questionnaire first, and were then asked to decide whether they had the time to participate or not. Furthermore, they were contacted at least two weeks before the interview to confirm a time and place suitable for them. All interviews were conducted based on these procedures and no problems arose.

Third, the behaviour of the interviewer is also believed to influence the validity of the interviews. High quality data require a flexible interviewer who is not tied to pre-prepared questions, since further vital questions may need to be inserted following the interviewees' responses. The interviewer's skills and prior training are believed to be crucial for good quality interviewing (Barriball and While, 1994). Several factors were expected to raise the researcher's competency in dealing with the interview schedule. Firstly, the researcher used to work as a qualified nurse, dealing with patients, relatives and medical staff, and had therefore developed strong interpersonal communication skills. Secondly, the researcher had worked as a lecturer in a university where he was regularly required to interview students. Thirdly, the researcher carried out some informal practice sessions of the schedule with colleagues to increase confidence. Fourthly, a thorough review of the field notes after each interview allowed the researcher to identify and act on any weaknesses. Fifthly, the pilot interview provided the researcher with invaluable experience.

Fourth, problems associated with the interviewees' behaviour, like their misunderstanding of some questions or long periods of silence, can be a further threat to validity. However, in this case, the researcher did not notice any such difficulties being experienced by the interviewees toward any of the questions. If any incongruity was identified during the interview, it was illuminated at that time. Additionally, long periods of silence were averted as far as possible by the researcher expressing some helpful brief statements like: "that's interesting", "I understand what you mean", etc.

Finally, the recording of interview data could constitute a validity risk but, in the current study, the researcher did not tape record the interviews. As well as tape recording, it is regular practice by researchers to postpone transcribing any interviews until all the interviews have been concluded, which may influence the quality of the data. In the current phase of the study, the researcher tended to record field notes from the interviews immediately after each interview, as will be described in the next subsection.

3.19 THE FIELD NOTES AND JUSTIFICATION FOR THEIR USE

Generally, field notes are defined as “descriptions and accounts of people, tasks, events, behaviour, and conversations that are useful in recordings events” (Watson et al., 2008, p.313). However, in the current phase of the study, the field notes (Appendix C3) were written down on paper during the interview itself. To avoid anything being missed or any inaccuracies occurring because of a delay in recording the data, immediately after the interview had finished, they were read and any abbreviations used were replaced with full words, and then they were typed up into a Word document in an organised format. In addition, reflective journalizing was carried out directly after each interview (Halcomb and Davidson, 2006), where the field notes were reviewed and some observations and comments were added.

The field notes were deemed the foundation for analysis so they were designed using a standardised approach committed to the structure of the interview schedule. The interview schedule blueprint was carefully planned, with enough space being made available between questions to record data (Appendix C2). This made the recording and analysis of the interview data simpler than if the data had been recorded in a more crowded fashion.

The notes which were taken during each interview were a recording of the salient points. Although no official training in shorthand had been received, the technique did not present any difficulties during the interviews. The researcher’s own shorthand method was sufficient for the task.

Using written field notes which are documented during an interview or immediately afterwards has been said to be superior to the use of tape recordings which are verbatim transcribed (Fasick, 2001, Wengraf, 2001). Fasick (2001) declared that, despite the precise record of the interview that is provided by the audiotapes, the difficulties presented in the process of coding and transcribing the content verbatim could minimise the value of such a method of data collection. Even enthusiastic QUAL authors stress the importance of field notes in capturing researchers’ interpretations and thoughts (Wengraf, 2001).

There were a number of justifications for taking field notes and not recording the interviews. This research used the mixed method approach of data collection, where the QUAL part was used sequentially to complement and explain the QUAN part. The present QUAL data were in the middle of a continuum, at one end of which are types of pure QUAL research like grounded theory, phenomenology, and ethnography, which are interested in the exploration of beliefs, values, thoughts, meanings, and feelings (Halcomb and Davidson, 2006). A proximity between the researcher and the data text is essential to the methodology and design of these studies (Halcomb and Davidson, 2006) and a verbatim transcription is therefore undoubtedly valuable in assisting the analysis of the data since these types of research often necessitate discourse, conversation, or narrative analysis. In these, the intonations are recorded accurately and the periods of silence calculated to partial seconds (King, 1998). At the other end of the continuum are the pure QUAN studies, in which questions can be answered from preset response categories using a structured interview. Hence, the field notes were considered to be enough for this study.

What is more, the QUAL data in this study tend to be descriptive. The QUAL description approach as described by Sandelowski (2000) is the least philosophical and theoretical oriented approach, compared to phenomenological, ethnographic, grounded theory, or narrative approaches. It is suitable when direct description of a topic and its informational content is needed. The current study aimed to explore how PU data are recorded and utilised in different TVNs' settings, which could be based mainly on the description of the organisations' policy, TV department policy or TVNs' experience. The study did not aim to explore any participants' feelings, attitudes, behaviours or any data of a subjective nature. Thus, the clarity of the research question make it easy to explore and describe the topic of interest, in contrast to that of pure QUAL research (Halcomb and Davidson, 2006).

In addition to the above, there are many other reasons which made the use of field notes sensible. In research with a lack of clarity, researchers need to be more flexible in the interview to elaborate on the topic more, leaving no time for notes to be taken and therefore creating the need for a tape recording (Hayes and Mattimoe, 2007). In this study, however, the topic was carefully planned and the researcher was very clear about

what to ask in the interviews. Furthermore, the QUAL template analysis technique which was used in this phase of the study, sought to identify common themes and ideas from the data and therefore did not inevitably require verbatim transcripts (Halcomb and Davidson, 2006).

3.20 STUDY SETTINGS AND POPULATIONS

A sample of TVNs from the QUAN phase of the study was chosen for the QUAL phase, to explain and elaborate findings. As mentioned earlier, they came from two settings, the TVS and the NHS.

3.21 SAMPLING ISSUES

3.21.1 Size

There are no standard and universal guidelines about the number of informants required for QUAL research, but it should not be too small, making it hard to reach data saturation (Morse, 1995, Flick, 2009), theoretical saturation (Strauss and Corbin, 1990), or informational redundancy (Lincoln and Guba, 1985). Alternatively, it should not be so large that it makes the substantial, subject oriented analysis difficult (Sandelowski, 1995).

Reaching saturation is the general rule for a sample size in interviews. That is, when the same stories, issues, themes, ideas and topics arise from the interviewees (Boyce and Neale, 2006), then at this point an adequate sample size has been achieved.

Some methodologists have presented guidelines for deciding on a sample size in QUAL research based on different factors, such as the data collection procedure (i.e. interview, focus group) (Guest et al., 2006), sample heterogeneity (Kuzel, 1992), or the interviewees experience (Romney et al., 1986).

Guest et al. (2006) suggest that research based on interviews as data collection tool should use twelve participants. This number was based on research which discovered, using data from 60 interviews, that the saturation occurred after the first twelve interviews were analysed. These twelve interviews produced 88% of the total number of codes generated for all sixty interviews. In fact, the central elements of the themes, accounting for 70% of the codes developed from all sixty interviews, were created as early on as after six interviews.

The sample heterogeneity is another established criteria (Kuzel, 1992). In a homogeneous sample, six to eight interviews are recommended but, if maximum variation is needed and the sample is heterogeneous, twelve to twenty interviews are required. In the current phase of the study, a certain level of respondents' homogeneity was assumed. The respondents were selected based on some common criteria; namely, that all of them were TVN specialists working in acute or community settings.

Romney et al. (1986) asserted that if interviewees have a certain degree of experience in the research area, then a sample of four interviewees may be enough to present complete and accurate data, with a confidence level described as high. Similarly, if the goal of the research is to understand a core experience, using at least six interviewees is recommended (Morse, 1994). Although these guidelines are practical, most authors do not state how these precise figures were reached.

In this phase of Study One, sixteen interviews were used for two main reasons. Firstly, this figure was within the recommended guidelines, given the fact that interviews were used as a data collection tool, the sample was homogenous, the respondents had great experience in the field, and the aim of the research was to understand the experiences of TVNs in as far as how they recorded and utilised PU data. Secondly, data saturation was obtained at this level. This was facilitated by the template analysis approach that was used to analyse the QUAL data, as it is discussed in the data analysis section (3.25).

3.21.2 Procedure

From the 167 TVNs who filled the questionnaire in, 50 were willing to be interviewed, and thus provided their email addresses in response to the last item on the questionnaire.

The interview sample was then drawn from these 50 TVNs. This was consistent with the method of sequential sampling, where the sample of the first phase of a mixed methods study informs the second phase (Teddle and Yu, 2007). In addition, the stratified random sampling technique was used. This is where participants from two or more strata of the population are selected randomly (Onwuegbuzie and Leech, 2007). Dividing the population into strata empowers the researcher to describe in detail the similarities and differences in the subgroups, or strata characteristics (Teddle and Yu, 2007).

The concept of stratification was introduced because two main groups of TVNs were identified, and characterised according to their settings. The primary care group included the TVNs working in community settings, such as PCTs. The secondary care group was made up of TVNs working in acute settings, such as hospitals (Figure 3.3). Out of the sixteen interviewees from primary settings, ten changed their minds and refused to participate, or in some cases provided an invalid email address, which made them inaccessible. The remaining six TVNs were chosen for the interview for reasons of convenience. Convenience sampling in QUAL studies is the sampling of interviewees on the basis of ease, such as because they are near at hand, easy to recruit, or highly likely to take part (Bowling, 2009).

In the secondary settings, the TVNs were selected randomly, since this was the only possible way to choose a sample from the 34 TVNs and to avoid bias. Moreover, any subject selected would have been useful in giving information regarding one or more systems. For example, TVNs who used a paper system could give information regarding paper systems and, likewise, TVNs who use electronic systems could give information about electronic systems. The TVNs who used combination systems, who were in the majority ($n= 21$ of 34), were able to give information about both. Even choosing the interviewees from only the last category would be sufficient to explore the topic. To select the participants, the email addresses of the 34 TVNs were written on pieces of paper and ten were drawn from a hat. Two rounds of analysis were used, as illustrated in the next section. The first round of analysis included six TVNs and the second round four interviewees.

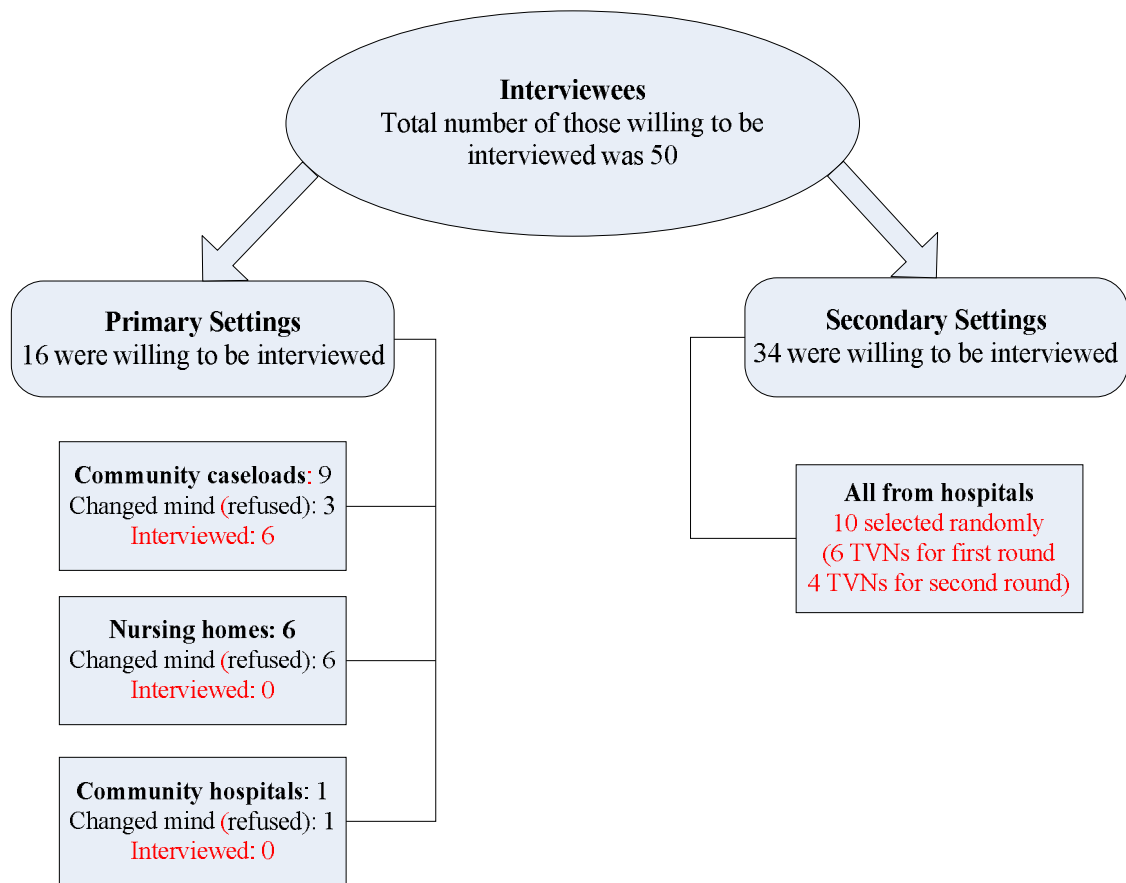


Figure 3.3 QUAL phase sampling

3.21.3 Data saturation

According to Guest et al. (2006) there are three related points which facilitate data saturation; the interview structure, its content, and participants homogeneity. In the present phase of the study, there was a particular structure within the interviews since the same questions were asked to all TVNs. Moreover, the intention of the interview questions was to elicit descriptions of the situation (i.e. how PU data is recorded and used), and there was no highly subjective interview content which could complicate the saturation. Finally, the interviewees were homogenous - all of them were TVN specialists working in either primary or secondary settings - and, as long as the participants are similar in their experience of the research topic, saturation will be attained quicker (Guest et al., 2006).

Guest and et al.'s (2006) procedure to reach saturation was followed by undertaking more than one round of analysis. In the current study, two rounds of analysis were

accomplished. Since the sample was homogenous and six interviewees were chosen conveniently from the primary settings, another six counterparts from the secondary settings were chosen randomly. These twelve interviewees were used in the first round of analysis.

The QUAL data analysis method that was used for this study was template analysis, as will be shown in section 3.25. The researcher constructed a codebook, or template in which identified themes were continually documented as each interview was analysed. The procedure was followed until the completion of the first round of the interviews (twelve interviews). It is important in this approach not to commence analysing the data too soon after collecting the data. Instead, the followers of this approach should wait until all the interviews have been completed to validate the initial template (King, 1998). To do this, the template was checked for any newly emerged themes or any modification of existing ones. It was clear that the full range of themes had been detected completely within the first twelve interviews since a diminished return rate for the template was observed in the last couple of interviews.

Although the template was reasonably stable following the first round of analysis, reaching saturation could not be assured until more data was collected. Thus, four more interviewees from the available TVNs working in secondary settings were selected randomly. The second round of analysis was performed following exactly the same procedure as in the first round and, again, the template was scrutinized for any change in the themes. Unsurprisingly, nothing happened to the template once data from the remaining four interviews were added. In other words, only previously identified themes were applied to the new interviews, since no new theme was produced beyond the thirteenth interview.

3.22 INTERVIEW SCHEDULE DESIGN

The final analysis will be distorted if a flawed research tool is used (Denzin, 1989). Thus, the interview schedule (Appendix C2) was carefully designed. First the literature was reviewed to delineate the area of interest that the interview would aim to cover.

Second, the research objectives and questions were carefully considered in this regard. Third, the findings of the QUAN phase were reviewed. Then, the first draft was exposed to internal testing (Mann, 1985 cited in Barriball and While, 1994, p.333). In other words, a preliminary assessment was carried out by research colleagues, where the leading questions were discussed and any vagueness was corrected based on the general criticisms which emerged (Barriball and While, 1994).

The final draft was judged by the research supervisory team for its content validity. The comprehensiveness and appropriateness of the schedule contents was assessed in line with the research objectives and questions. Mann (1985 cited in Barriball and While, 1994, p.333) has recommended that participants should be involved in the creation of the interview schedule, so two TVNs - one from the primary settings and the other from the secondary settings - were consulted. This discussion about the questions, wording, and ordering of the schedule was valuable to its construction. Moreover, a pilot testing of the schedule was performed.

3.23 PILOT TESTING OF THE INTERVIEW SCHEDULE

The final schedule was piloted with the first TVN who was chosen to be interviewed from the acute settings. A face to face interview was held with this informant, in the presence of one member of the research supervisory team. The interview was conducted in the work place of the TVN, and lasted for around 40 minutes. Field notes were also taken.

The pilot interview was very useful for the researcher. It was used to assess the interview schedule's applicability in terms of time and flow of questions and to evaluate the interviewee's understanding of the schedule wording. The presence of the research supervisor was constructive in supervising the interview and assessing the researcher's interviewing skills, noting, for example, whether there was appropriate use of probing.

The appraisal of the interview, which was gained from the researcher's notes and the feedback of the research supervisor, did not identify any momentous problems. However, minor changes were made to the order of the questions and a few secondary questions were added. The data from this interview was also incorporated in the actual analysis of the QUAL data since the interviewee used electronic recording of PU data, and this category was under-represented. Thus, this interview data was deemed as useful and, if it was not included, a huge misunderstanding of this category could have occurred. Basic analysis of the pilot interview identified the interview schedule's effectiveness in exploring how PU data is recorded and used (Barriball and While, 1994), and this assured the validity (Hutchinson and Wilson, 1992).

3.24 CONDUCTING THE INTERVIEWS

Most of the interviews were conducted over the phone, except for two which were conducted at the TVNs' work places in a suitable, quiet environment. One of those interviewees was from the primary settings and the other was from the secondary settings. The remaining interviews were conducted in a quiet office in the researcher's university, with telephone facilities provided by a member of the supervisory team for this purpose. The interviews lasted between 20 and 40 minutes. Written consent had been attained before beginning the interviews by means of a consent form which was sent to each interviewee along with the interview schedule, for ethical purposes and to achieve replies with greater depth. A promise of confidentiality and anonymity was given to the TVNs before each interview, helping to place them at ease. No recordings were made of the interviews, since the researcher was not interested in analysing every single word that the interviewees uttered. Field notes were taken during the interviews and were organised and typed up immediately after each interview ended. This consumed a lot of time.

3.25 DATA ANALYSIS

3.25.1 Overview of template analysis

Data from the field notes were coded by theme, which is defined as “A pattern found in the information that at minimum describes and organises the possible observations, and at maximum interprets aspects of the phenomenon” (Boyatzis, 1998, p.4). Regular discussions were arranged between the researcher and one of the research supervisors to identify the emerging themes. Thematic analysis was used to analyse the QUAL data of this study. Boyatzis (1998, p.vi) defines thematic analysis as “a process of encoding qualitative information”, which can be performed by recognizing themes in the data and adding a label to index them (King, 2004).

Several QUAL data analysis approaches exist in the literature but the template analysis approach, which is a style of thematic analysis developed by Crabtree and Miller (1992) was chosen for this study. It is now frequently employed in healthcare QUAL research (Crabtree and Miller, 1999, King, 2004). King (1998) describes it as an approach to analysing the QUAL data thematically.

Crabtree and Miller (1992) developed four types of approaches to analyse QUAL data and locate them on a continuum, ranging from the standardised objective style to the interpretative subjective style. Selecting one of these approaches depends on several factors, such as the research objectives and questions, what is already known regarding the area of the interest, and the procedure used to collect data. Firstly, there is a quasi statistics approach, where the basic or manifest content analysis is used. In this approach, the data are read and scrutinized for certain words or themes. Then, these themes are classified into groups or categories and the frequency of the occurrence of these particular words or themes is calculated.

The second style is template analysis, where the researcher utilises a template or analysis guide. This style was chosen for this study. In the template, a priori themes recognized depend on the researcher’s previous knowledge (Crabtree and Miller, 1992). The researcher reads the data, and any sections of it which inform something relevant to the research question will be marked. When these sections match a priori themes, they

are coded in these themes. Otherwise, new themes are recognized and built into the initial template. King (2004) refer coding as the labelling of a section of the text as related to a theme in the data. The codes are crucial for interpretation.

The initial template is applied to the entire data set to recognize relevant themes for analysis. It can be modified if it is not useful or appropriate to the actual data collected. Once all data is coded to the initial template, the final version is reached, which will serve as the foundation for the researcher's interpretation of the data, and the writing-up of the findings (King, 2004).

The editing analysis style is the third approach. This method moves the analysis closer to the subjective interpretive area of the continuum. It is called editing because the researcher carries out many editing tasks such as cutting, pasting, searching and rearranging the meaningful sections of the data text to locate parts which reveal the interpretive truth in the data. This style of analysis makes no use of any prior knowledge or preconceptions before the data is read. Once the useful are recognized, the data is classified and organised into codes. Then, the patterns and themes that connect these codes are determined. This approach is linked to grounded theory methodology.

Finally, at the farthest end of the continuum is the crystallisation analysis style. In this approach, prolonged immersion and experience of the data by being more subjective in dealing with the data are required. This would result in an intuitive interpretation of the data. It is used in stories and case reports of a subjective nature. The third and fourth styles are used when scant knowledge already exists about the area of interest.

3.25.2 Justification for using template analysis

Many reasons can be given to support our use of template analysis. The hallmark of when it is appropriate to use this method is the presence of good prior knowledge about the topic of interest (Crabtree and Miller, 1999). In this phase of study, this kind of knowledge was assured because the QUAN phase of the study had already been undertaken. Data from the interviews was collected depending on a priori themes, established even before beginning the actual data collection, though some new themes also developed later. Thus, there was real pre-existing knowledge of the topic, meaning

that the third and fourth styles of analysis, where data is coded naively to build up a theory from the data, could be excluded. Although some themes were quantified, the decisive aim of the analysis was not to present the QUAL data statistically, which also meant that using the first style was not an option.

Moreover, the QUAN phase of the study raised some issues which it was felt should be researched, facilitating the creation of the *priori* themes that characterise this approach to analysis. For example, the types of recording systems available for PU data were investigated in the QUAN phase, but the QUAL phase was where the advantages and disadvantages of these systems could be explored further.

The field notes which were documented by the researcher were already filtered and did not need the open interpretation that is required for transcripts data (Crabtree and Miller, 1992). The notes were consistent with the template analysis approach, as it is claimed that a full verbatim transcription is not necessary for this approach at all (King, 1998). Moreover, this approach is used to analyse data that can be placed somewhere between the highly structured data which is involved in QUAN research and is analysed by content analysis, for example, and the highly open type of data which is linked to pure QUAL research which employs grounded theory, for example (King, 1998). The current study was a medium between the two.

3.25.3 Advantages and disadvantages of template analysis

The presence of a template can accelerate the initial coding stage of analysis. Moreover, it is a highly flexible style that can be customized according to the data (King, 1998, King, 2004). The template is tailored to the data, rather than the data being tailored to the template, giving it flexibility.

On the other hand, some disadvantages exist for this analysis approach. The researcher may concentrate mainly on data which fits the identified *priori* themes, and neglect data which does not relate to them. At the same time, the researcher may fail to identify when an *a priori* theme is an ineffective way of characterising the data (King, 1998, King, 2004). To prevent this from happening in the current study, the created *priori* themes were recognised as tentative and equally as prone to restructuring or deletion as

any other theme. Moreover, the suggestion of King (1998) was adopted and only a limited number of priori themes was used. The paucity of literature about this approach to analysis could constitute another disadvantage of its use. Only two sources discussing it were located by the researcher (Crabtree and Miller, 1992, King, 1998, Crabtree and Miller, 1999, King, 2004).

3.25.4 Stages of data analysis

In this section, the template analysis approach will be applied to the current phase data, and there will be an explanation of how it was used to analyse and interpret the findings. Several stages come into effect in the process of analysing QUAL data according to this approach, and in some stages there are further essential steps which needed to be taken (Crabtree and Miller, 1992, King, 1998, Crabtree and Miller, 1999, King, 2004):

First: It is necessary to create the initial template that will guide the analysis. The template is the data management tool that groups parallel themes together to facilitate the interpretation (Crabtree and Miller, 1999). The initial template in this study was generated from two major sources; priori themes and the themes that came from the collected data.

- Priori themes: the researcher defines these themes before beginning to analyse the data. The *priori* themes can come from theory, pre-existing knowledge or the research tradition (Crabtree and Miller, 1992, Crabtree and Miller, 1999). In the present study, the researcher defined the priori themes using the research questions and the interview schedule (Figure 3.4). King (1998) suggests that the interview schedule can be a paramount source in the construction of the initial template, where the major questions in the schedule can be the higher-order codes, and the sub-questions and probes the lower-order codes.

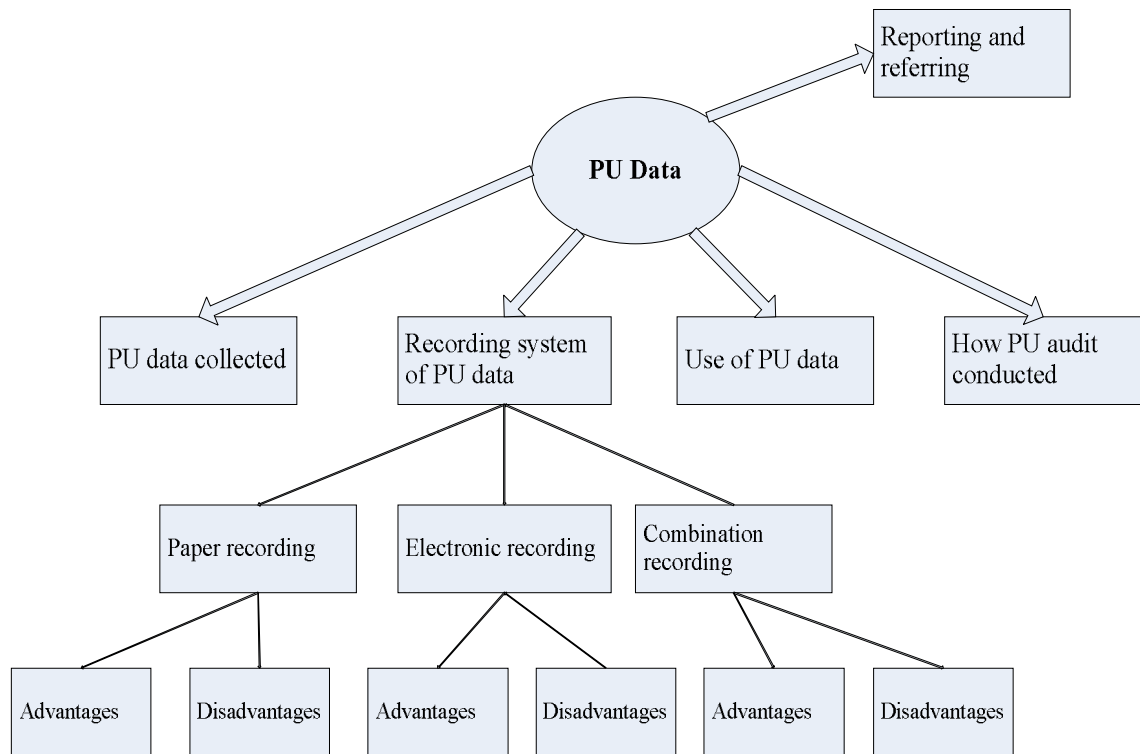


Figure 3.4 Priori themes of the study

- Preliminary exploration of the data: The initial template can also be produced after conducting initial coding on all data (e.g. all interview field notes), or often after coding a sub-set of transcripts (King, 1998, King, 2004). In this study, the initial template was created at a reasonably early stage, after doing preliminary coding of the first two interviews. The reason why this was possible is that the study addressed fairly specific questions (King, 2004), and it was accomplished by reading the field notes of the two interviews and identifying any section of the data that related to the research question. If this section captured one of the priori themes, it was connected to them. If there were no relevant themes that the section could go under, two actions were taken: either the existing theme was amended or a new one was invented.

The coding can be performed either by hand on the printed transcripts, or electronically (Crabtree and Miller, 1992, King, 1998, Crabtree and Miller, 1999, King, 2004). For

this study, manual coding of the printed field notes was used because the data was clear and the number of interviewees was relatively low so it was decided that there was no need to use a computer to analyse the interviews.

The initial template produced was a very broad template (Figure 3.5), which was not concerned with fine features. It was left to the data to alter the template and generate the final version. The template was not supposed to have too many predetermined themes that could obscure the themes' accuracy. On the other hand, too few themes could restrict their interpretation (King, 2004). In the same way, the level of coding was decided to be primarily a one-order level, since too many levels could make the template less clear (King, 2004). One theme was except from this rule, where it was deemed necessary to use a three-order level coding (Figure 3.5).

The primary exploration of the first two interviews lead to some amendments being made to the early themes which appear in Figure 3.4, and this involved many steps. The first step was changing the scope of the theme "reporting and referring", since it was felt that this was too broad. It was therefore split into two separate themes, "reporting" and "referring". The second step was the deletion of a third-order level code, the advantages and disadvantages of combination systems, since it was judged not to be useful. Since the combination systems involve both the paper and electronic recording systems and there was no unique standalone combination system, the advantages and disadvantages will refer to either of those systems, and it would have been pointless to add such a theme, as nothing would need to be coded under it.

Hence, the initial template was developed using many sources. It was a priori, based on the research questions and the interview schedule and was then modified according to the initial coding of the data. The template, in its semi-final shape, was applied to the entire data set, in order to reach the final template which would be used to interpret the findings.

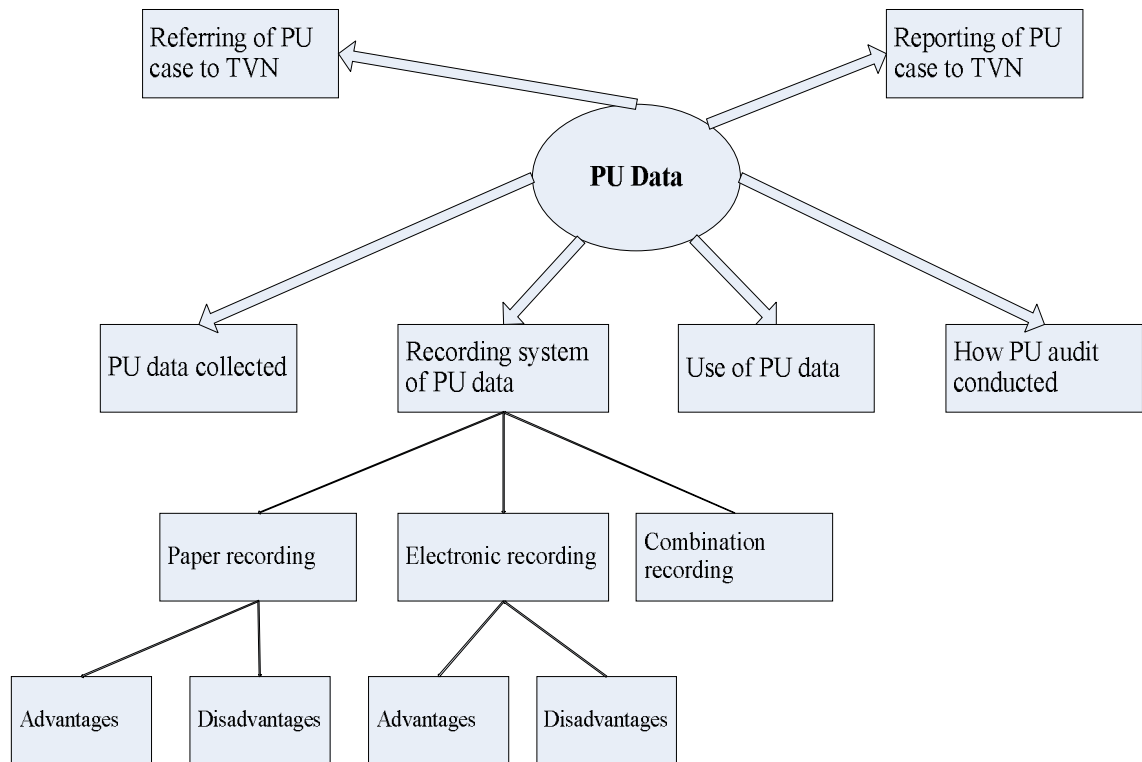


Figure 3.5 Initial template of the study

Second: The template is developed further by applying it to the full data set. The themes of the initial template were applied to every single interview's field notes to identify meaningful sections of the data. The template guided the analysis at this stage. Any related sections recognized in the data went under the determined theme. If a section was judged to be relevant to the research question and did not fit contentedly or was not covered sufficiently by an available theme, an adjustment to the template was made.

The themes inside the template should be linked together to make it meaningful (Crabtree and Miller, 1999). This was done by reading the themes and connecting them, either by chunking or displaying (Crabtree and Miller, 1999). Chunking is carried out by exploring large chunks of related and similarly coded data, which are searched for additional patterns, connections, and associations. Displaying involves using maps, matrices or diagrams to facilitate noting different coded sections of data collectively. In the current study, a diagram was used to link together the themes that were identified from the data.

Developing the template is a continuous process. Various adaptations were made to the initial template before the final version was obtained. The modifications performed involved many steps. The first step was inserting some new sub-themes that emerged from the data to their higher-order level themes in the case of the following; “Data collected and recorded”, “How PU audit conducted” and “Use of PU data”. These sub-themes which originated in the data were relevant to the research question and were not covered by any existing theme in the initial template. Therefore, they were defined and codes were added to them from the data (Figure 3.6). The second step was changing the scope of some themes. Since the first-order level themes “referring” and “reporting” were still too broad to be useful, they were narrowed to include some second and third-order level codes.

In theory, the process of template development could go on indefinitely (King, 2004). Ending the process in this study was a pragmatic decision. It was believed that the final version of the template which appears in Figure 3.6 symbolised a good representation of all potential themes in the data. The decision was based on the fact that the template began to offer diminished returns (King, 2004) since, the long period of time spent on coding did not produce many new themes that were markedly different from those in the existing template (King, 2004). In other words, a little gain in template quality was not worth the cost of constantly reviewing it. After three revisions of the template by applying it to the full set of the data, no new themes emerged. Moreover, to guarantee the quality and comprehensiveness of the template, it was officially assessed by the research supervisory team.

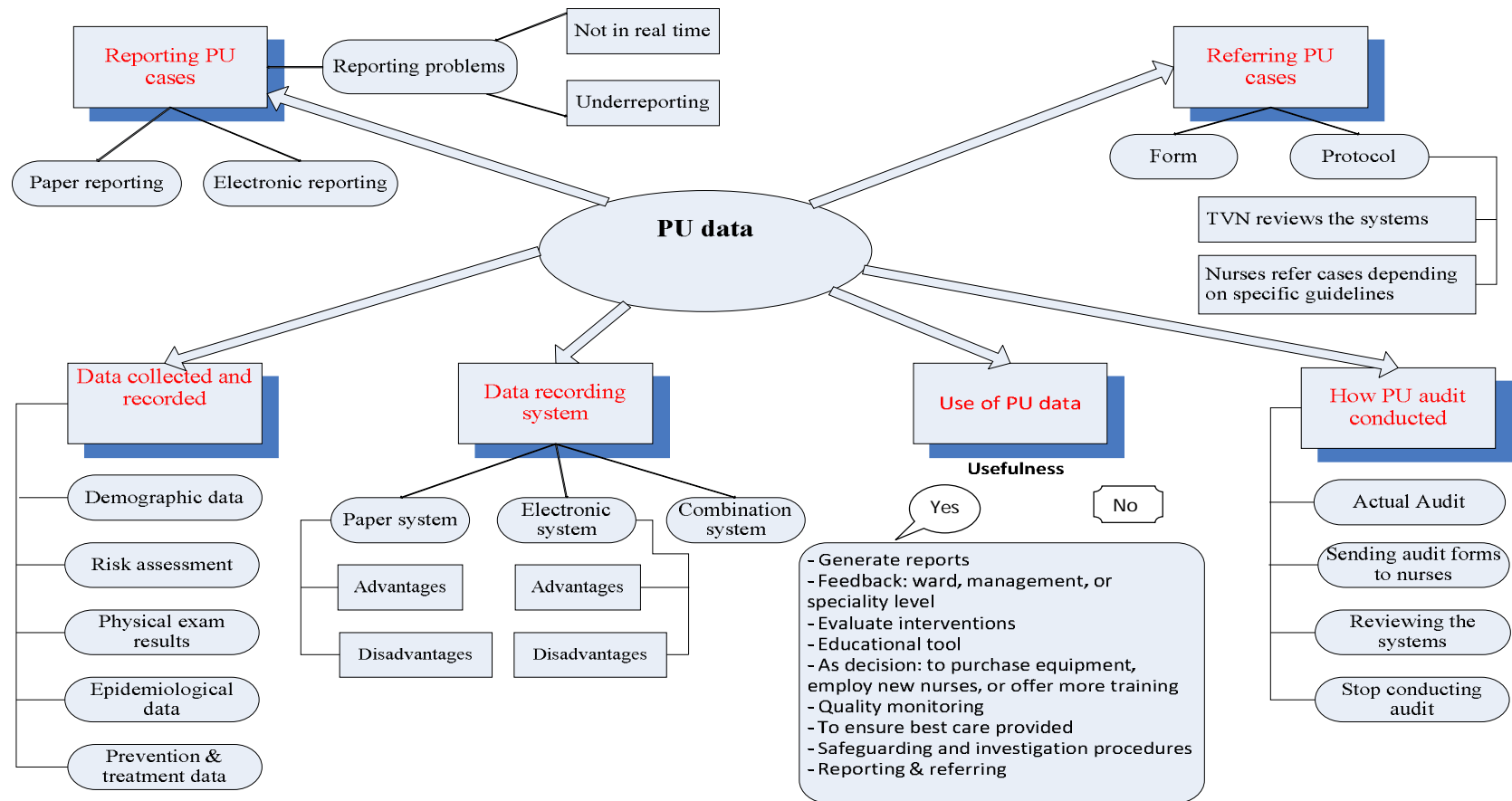


Figure 3.6 Final Template

Third: The template shown in Figure 3.6 was used to interpret and write up the findings of this phase of the study. The interpretation was based on forming an account or description of the main themes identified in the data, offering some clarifying examples or quotations from the field notes as needed (King, 1998, King, 2004). The basic principle that was followed was that a single statement was deemed as important as those agreed or repeated by others in the sample (King, 2004). Furthermore, some themes offered a QUAN summary of the account. The quantification was used solely to make the results easily intelligible by condensing them. The approach was still QUAL, where the naturally occurring events were acknowledged on a QUAL foundation, but also counted (Mays and Pope, 1995).

Fourth: A quality check was undertaken at some stages of analysis, to certify that the researcher's possible presumptions and preconceptions were not distorting the analysis (Crabtree and Miller, 1992), and to minimise the occurrence of over or under interpretation of the data. Excellent inter-rater reliability and consensus were guaranteed by employing the independent scrutiny of one skilled QUAL researcher from the research supervisory team at different stages. The check was performed at the following moments:

- Developing the final template stage: a member of the research supervisory team performed preliminary coding on all field notes independently, yielding their own template which was compared and contrasted with the researcher's, the suitability and appropriateness of the codes was also verified (Crabtree and Miller, 1992). Fortunately, total agreement was attained between the two, and no amendments were needed to be made to the final template.
- Interpretation of the findings stage: the same research supervisor was given the final agreed template, with the sixteen field notes, and the final results report. Interrogation of the interpretation was undertaken, and everything was found to be in line with the template and the interview field notes.

Study Two Method (Jordan)

The current study was conducted in Jordan, to quantify the prevalence rate of PU. However, before discussing the details of the methodology of this study, it is important to outline the Jordanian context.

3.26 THE JORDANIAN BACKGROUND AND CONTEXT

The formal name of Jordan is the Hashemite Kingdom of Jordan. It is located in the Middle East. Excluding the coastal border on the Aqaba Gulf (26 Km), land borders Jordan in all directions (Figure 3.7). The neighbouring countries are Iraq, Syria, the West Bank, Israel, and the longest border is with Saudi Arabia. The total area of Jordan is 92.300 km², of which the land makes up 99.6% (91.971 km²), and the remaining 329 km² is represented by the Aqaba Gulf and the Dead Sea, which is the lowest point on Earth (Central Intelligence Agency (CIA), 2009).



Figure 3.7 Jordan Map ²

Jordan is a small country, and the last estimation made in 26th of May 2009 by the department of statistics (DOS) revealed that the total population was 5,901,707, with 52% male and 48% female (DOS, 2009). The majority of the population is Jordanian (93%), with a presence of some immigrants from neighbouring countries (7%) (U.S. Department of State, 2007). It is considered a young country with a growth rate of 2.264% (U.S. Department of State, 2007).

The majority of Jordanian people are Arab (98%). The remainder are divided equally between Circassians and Armenians (CIA, 2009). Islam is the official religion of the country, where 92% are Sunni Muslims, 6% are Christians, and other religious minorities are Bahai and Druze (2%) (CIA, 2009). Regarding language, Arabic is the official language of the country but English is widely used in certain sectors, such as trade, education, health, and government.

Jordan was ruled by Great Britain for longer than 25 years, and acquired independence on 25th May 1946. King Hussein (1953-1999) ruled the country after the independence

² CIA, 2009. *Jordan map*. [image online]. Available at: < <https://www.cia.gov/library/publications/the-world-factbook/geos/jo.html> > [Accessed 11 June 2009].

and, through his pragmatic style of leadership, was able to develop the country in spite of limited resources. The country is ruled by the king, who appoints a prime minister to exercise his executive authority. The prime minister is able to appoint the cabinet members. Legislative authority is exercised by two houses: the House of Representatives, elected by the residents, and the House of Senate, whose members are selected by the king (U.S. Department of State, 2007).

King Abdullah II has ruled Jordan since his father died in February 1999. In his time, the country has improved in all sectors. Jordan entered the world trade organisation in 2000, and the European Free Trade Association in 2001 (CIA, 2009). Moreover, the current king focuses on the human being as an extremely valuable resource. Thus, the literacy rate grew from 33% in 1952 to 85% in 1996, and the last estimate in 2005 revealed that it was at 91.3% (U.S. Department of State, 2007). One of the most important sectors he has given his attention to is the healthcare system.

3.26.1 Healthcare system in Jordan

The Jordanian healthcare system is now well developed and has a good reputation in the Middle East (Library of Congress, 2006). Health services are provided to Jordanian residents and patients of other countries such as Palestine, Syria, Iraq, Sudan, Egypt, and Libya (Library of Congress, 2006). According to the Ministry of Health (MOH) in Jordan, the government spent about 7.2% of the Gross domestic product (GDP) in 2008 on the healthcare system (MOH, 2008). This rate is close to the international figure average of 9.3% (Library of Congress, 2006).

The total number of hospitals in Jordan is 103, and these are either public or private. The public sector has three branches. First, the Ministry of Health, which runs 30 hospitals comprising 38.7% of the total number of hospital beds. Second, the military's Royal Medical Services which operates 11 hospitals which constitute 19% of total hospital beds. Third, two university hospitals which run 9.2% of total hospital beds. The private sector also manages 60 hospitals, which represent 33.1% of the total beds (MOH, 2008).

3.27 RESEARCH DESIGN

This study employed a cross sectional prevalence survey, since most PU prevalence studies are cross-sectional studies. Polit and Beck (2008, p.751) define the cross sectional design as a “design in which data are collected at one point in time; sometimes used to infer change over time when data are collected from different age or developmental groups”. This type of study is descriptive in nature since it presents a QUAN description of the size of a problem without determining the cause-effect relationship (Friss and Sellers, 2009). It can be used to establish the severity of a health problem by involving every subject in the population or by taking a sample from the population and drawing conclusions from it for the rest. The second option is the most frequent since it requires minimal time and costs (Friss and Sellers, 2009).

Prevalence surveys are also descriptive in nature since they describe the frequency of the occurrence of a condition or type of behaviour over a period of time (Polit and Beck, 2008). In Study Two of the current research, a point prevalence study has been conducted at one point of time (i.e. on one day) to calculate PU prevalence in Jordanian settings.

3.28 RESEARCH QUESTIONS

What is the prevalence rate of PUs in Jordan?

In addition to this major question, the following two secondary questions were addressed:

- What percentage of Jordanian patients are at risk of PU?
- What percentage of patients who should receive preventive care actually receive this care?

3.29 SETTINGS

The current study was conducted in two hospitals which were chosen for reasons of convenience, since they are large, have mixed specialties, and are typical of the healthcare system in Jordan. The chosen hospitals are the biggest in the north of Jordan, with at least 200 patients each. Both are located in Irbid, the second largest city in Jordan (1,041,300 people, 17.8% of the total population), and it is the biggest city in north of Jordan (DOS, 2009). Moreover, each one represents a different type of healthcare system. One of them is a university hospital, while the other represents public or general hospitals in Jordan.

However, many other reasons exist for choosing these two hospitals. They both have a wide range of specialties so could cover all the areas where PU cases exist. In addition, no previous study has been conducted in any hospital in Jordan regarding PU prevalence, which makes any large, representative hospital suitable for this study. The time constraints, especially for this particular part of the research, also played an important role. The ethical approval process and data collection would have been much more time-consuming if more than just these two hospitals were chosen, especially since the capital is about 80 Km from the two research sites.

3.30 STUDY POPULATION AND SAMPLES

3.30.1 Sampling procedure

The sample in the current study was convenience. That is, all patients admitted or present in the selected wards in both hospitals, with the respect to the inclusion criteria, on the specific days that the survey took place. This is a non-probability sample.

Due to the randomization assumption, a probability sample is considered more representative (May, 2001). However, it is not always the best option. Employing the probability sampling technique in this prevalence study could have had drawbacks.

Firstly, the randomisation would have excluded many patients from participation when the aim was to include as many patients as possible in order to gain a more representative and generalizable prevalence rate from the sample. Secondly, randomization in selecting the wards would mean that some low risk wards such as maternity, paediatrics and psychiatry could be included, and that would influence the overall prevalence rate. Thirdly, a random sample would minimise the chances of obtaining the sufficient number of patients required to achieve meaningful estimates.

3.30.2 The inclusion criteria

The sample included all patients in the appointed wards: internal medicine, surgical, orthopaedics, and intensive care units. It included patients who were newly admitted or those who were due to be discharged soon. The patients had to be eighteen years of age and above, and admitted to each hospital before midnight on the day of the survey. The participants were asked to complete a consent form. In the case of incapacity, the participants' next of kin provided the consent.

3.30.3 The exclusion criteria:

The exclusion criteria given in Table 3.2:

Table 3.2 The sample exclusion criteria

- Patients in the following wards: paediatric, psychiatry, day care, and maternity. This was as per the EPUAP study, to ensure comparability with that study (Vanderwee et al., 2007a), and also because PUs are rare in these areas (Lepisto et al., 2001, Bours et al., 2002, Vanderwee et al., 2007a). Furthermore, patients in the emergency and outpatient clinics were excluded, due to their short length of stay (LOS) in hospital and the absence of risk of PU in these wards (Bours et al., 2002, Barrois et al., 2008).
- Patients for whom physical examinations would be inappropriate, such as those who could not move for clinical reasons, or were too unstable to change their position for examination.
- Patients who were unavailable on the ward during the course of the survey.
- Patients who declined to participate verbally or when no consent was attained.
- Patients discharged from the wards before the survey commenced. However, extra attention was given to those patients, and the researcher tried to examine them first.

3.30.4 Sample size:

In this study, all patients in each participating hospital with respect to the inclusion criteria were included (Included=359 patients, completed= 302 patients).

3.31 STUDY INSTRUMENT

3.31.1 Overview of the instrument

The instrument which was used in Jordan (Appendix C4) is the same as that which was used in the EPUAP study, to ensure a high level of reliability, validity and

comparability. The instrument was based originally on the Netherlands experience (Bours et al., 2002), and it was developed after a number of steps. First, the content of the instrument was outlined by 18 PU experts from ten European countries, who are members of the EPUAP. Then, detailed discussions on the instrument were carried out by six PU experts from different European countries. Finally, approval was given for the instrument by all EPUAP trustees (Vanderwee et al., 2007a). It was used to calculate PU prevalence in a number of European countries, in at least two hospitals per country (Vanderwee et al., 2007a) and it has also been used in many prevalence studies around the world. Therefore, it has been tested, and the reliability and validity of the instrument were assured.

3.31.2 Instrument content

In this survey, the following data were collected, with the operational definition for each category provided:

- 1- General data: This section included general data about the hospitals, such as the type of hospital, the number of beds and the number of PU patients in each hospital.
- 2- Patient data: This part contained general patient data, such as age, gender, length of stay, previous hospitalisation and the specialty.
- 3- Risk assessment: The Braden scale was used to assess the susceptibility of each participating patient to develop PUs (Braden and Bergstrom, 1987). According to the EPUAP study, patients with a Braden score <17 are deemed as in need of preventive measures. A sub-score for incontinence based on the Norton scale was added to the risk assessment section of this instrument to give specific data about patient's level of continence, and because of the fact that the Braden scale does not differentiate between moist (perspiration) and wet (urine) (Bours et al., 2004).
- 4- Skin observation: This is the clinical part of the study. The researcher inspected the skin of all participating patients. The location and grade of PUs were recorded if they were found.
- 5- Prevention: This part was used to record the preventive measures taken for patients. These include equipment and repositioning. The equipment was classified as non-specialist (e.g. standard hospital mattress), non-powered (e.g. pressure reducing foam mattress) or powered (any equipment with an electrical supply). Regular repositioning was documented as either not planned or irregularly delivered, or at frequencies of every 2, 3 or 4 hours.

3.31.3 Validity and reliability of the instrument

This study is a methodological iteration of the EPUAP study, in order to obtain comparable international results. Thus, their instrument has been used. The two major components of the tool are the PU grading and risk assessment using the EPUAP system and Braden scale respectively. The validity and reliability of these components was estimated to be high in the EPUAP study (Vanderwee et al., 2007a), and in many studies, as discussed in the literature review chapter (Chapter 2).

The inter-rater reliability of the EPUAP classification system has been investigated in many studies. However, excellent agreement has been reported with a kappa of >0.8 (Bours et al., 1999, Defloor and Schoonhoven, 2004). In the EPUAP study, high inter-rater reliability was found in grading the most severe ulcers in all participating countries (Spearman's $\rho=0.96$, $p<0.01$) (Vanderwee et al., 2007a). Moreover, a pilot study was conducted to ensure good reliability before patients were assessed using this scale.

Regarding the Braden scale, its psychometric properties have been broadly tested (Defloor and Grypdonck, 2005, Pancorbo-Hidalgo et al., 2006, Kottner and Dassen, 2008b). Also, in the EPUAP study, the level of agreement between raters was very high for the Braden scale (Spearman's $\rho=0.98$, $p<0.01$) (Vanderwee et al., 2007a).

3.31.4 Pilot study

Since the study outcomes were based on the data quality, showing a high level of PU grading reliability was essential. This could only be measured by conducting a pilot study. In this pilot study, the researcher assessed 20 PU photographs and graded them according to the EPUAP classification system as PU grades 1-4, erythema, incontinence lesion and moisture lesion. The researcher's assessments were compared to TV expert assessment. After that, inter-rater reliability was determined using the percentage of agreement and Cohen's Kappa. This was done before the actual prevalence survey commenced. The calculated Kappa for this study was 0.853 ($p<0.001$), and the percentage of agreement between the researcher and the expert was 90%. Both indicate excellent agreement.

3.32 ETHICAL APPROVAL

Ethical approval for Study Two was granted from two sources; the ethics committee of the Faculty of Health and Life Sciences at the researcher's university (Appendix B1), and the ethics and research committees in the hospitals in Jordan in which the study took place (Appendices B3 and B4).

The PIS (Appendix B8) and consent form (Appendix B9) were handed to patients just one day before the actual collection of the data, due to their short LOS in the participating hospitals, as both are acute hospitals. However, this was judged to be enough time for patients to decide whether to participate or not. Verbal information was also provided to outline the study aims and procedures. In the case of unconscious patients and patients who were unable to give consent, permission was gained from the patient's next of kin. On the day of the survey, the signed consent form was collected, and verbal consent was sought as well, before commencing with patients' examinations or reviewing their records.

The confidentiality and anonymity of the patients was ensured throughout the study. The patients' names were not taken, and instead their file numbers were used to identify the patients and allow the researcher to access information relating to them.

Patients were not obliged to participate in the study, and they were reassured that they could withdraw from the study at any time without consequences. This could safeguard the patient's freedom and choices and, at the same time, minimise the legal responsibility of the researcher (Bowling, 2009). The study involved inspecting the entire skin of the patients, which may be embarrassing and inconvenient to some. This was stressed in the PIS and consent form, and it was repeated verbally by the researcher on the day of the survey.

3.33 DATA COLLECTION PROCEDURES

Since the number of raters appears not to affect the ability to identify PU cases accurately (Kottner et al., 2009c, Kottner et al., 2009d), nor, therefore, the calculated prevalence rate, it was decided that only one rater would be used for this study. Thus, the researcher collected the data alone to ensure greater reliability, by avoiding any differences that may have occurred if more than one rater was used for reporting the existence, number, location and grade of PUs. Moreover, this helped to save valuable research resources (Kottner et al., 2009d) and, in fact, the influence of rater qualifications may be of more importance in detecting PU than the number of raters (Kottner et al., 2009d).

The current study was conducted over three days in each hospital, which is not an uncommon time frame in this type of research. In Capon and co-workers' (2007) study, a single trained nurse visited patients (n=571) in order to identify PUs during the period between February 1st and March 22nd 2005. Another similar study was conducted over one week (Barrois et al., 2008) and, in the Netherlands, the prevalence survey was conducted over four days (Bours et al., 2002). Furthermore, Gallagher and co-investigators's (2008) study was conducted in 3 hospitals over a 2 day period. The procedure for conducting the present study involved several stages, which are described below.

3.33.1 Organisation stage

Since this was a point prevalence study, only patients present on the first day (over 24 hours) were included and patients who were newly admitted on the second or third day were excluded. A list of all inpatients and newly admitted patients in each ward was generated by the clerks on day one. The first day and most of the second day in each hospital were used to assess the patients' skin in their rooms and, at the same time, to assess the degree of risk by reference to the Braden scale. If an ulcer was found, it was graded according to the EPUAP grading system and recorded in the study instrument.

The remainder of the second and third days were used to review the files of the assessed patients and record some necessary data.

3.33.2 Skin inspection stage

The patients' examinations and data collection started at 0600 am in the critical care units. Most of those patients were unconscious and, at this time, the morning care was taking place, so patients' wound dressings had already been removed and their skin exposed, making the inspections easier to carry out. The researcher then progressed to other wards to examine more patients. A decision was taken to start early in the morning to reach the patients before they left the wards to attend other units such as operation rooms, laboratory procedures, radiology or even to be discharged. The patients who were scheduled for transfer or discharge were prioritized and examined first.

The researcher approached the patients and introduced himself, also checking that they had adequate information about the study and answering any questions which were raised. Then, the signed consent forms that had been given out one day before the study were collected from the patients. Extra copies were presented for patients admitted on the day of the survey. Furthermore, verbal consent was also taken before the study commenced.

The skin examinations began by the researcher performing a full inspection of each patient's skin, and recording the findings. High focus was given to areas of high risk (i.e. back of the head, shoulders, sacrum, trochanter, ischium, elbow, heels, and ears). In the case of unconscious patients or those who were unable to turn on their own, a ward nurse helped the researcher to turn the patients, removing any stocks, splints and dressings if possible, in order that the area could be examined clearly.

If grade one PU was noted, the patient was repositioned off the affected site for 30 minutes (Strachan and Balding, 2004), and then re-inspected to reduce the probability of over or under assessment of grade one PUs, especially since they are often confusedly misdiagnosed as reactive hyperaemia.

All measures were taken to prevent redundancy resulting from examining or counting the same patient twice. In all the wards, each patient's number and first name were checked before they were examined and then they were removed from the list. If a patient was unavailable in his room, the nurses were asked about him and if the patient had gone for a test or for radiation, his examination was postponed until the end of the ward visit and he was examined on his return. Otherwise, a note was made beside his name to indicate that he should be examined later. In the case of patient transfer to other wards in the hospital, a note was written about his new ward and he was added to that ward's list. Moreover, the examinations were completed within two days, which made it difficult to examine any patient twice. Fortunately for the researcher, no patients were discharged during the examination period. The nurses were asked to identify patients for whom there was a possibility of imminent discharge so that those patients could be examined first but, in fact, the results chapter (Chapter 4) shows that most of the patients were newly admitted to the hospitals and more than half of them were in hospital for less than three days.

In the evening of the first day a list of patients newly admitted that day was obtained, and the eligible ones were assessed in the same way. At the end of the examinations, all patients were left in a comfortable position and thanked for participating in the study. Finally, all the data was recorded on the study instrument, where there was one separate form for each patient.

3.33.3 Record review stage

A review of each patient's records was performed carefully. In these records, there were no specific forms to document PU data so nurses' notes and any other existing forms in the records were looked at to identify any documentation relevant to PUs.

This review covered two main aspects: Firstly, demographic data like patient age, gender, history of previous hospitalisation, date of admission and LOS from admission until the survey time, to gain a full clinical picture of the patients; and secondly, prevention data, for which principally information on turning was recorded. Information on the mattresses was noted by looking at the beds and patients' files were not

necessary here. It was not possible to watch the nurses repositioning the 302 patients but positioning documentation was available on a specific sheet which existed for this purpose. The presence of EHRs in the university hospital made reviewing the patient files there easier than in the general hospital, which still relies on paper records.

3.33.4 Completion stage

At the end of the patient's examination and record check, the researcher reviewed the data collection forms to identify and correct any missed data. Then, the data were coded by the researcher, and entered into the SPSS program to be ready for analysis.

3.34 DATA ENTRY AND ANALYSIS

Data were analysed using SPSS version 16 (SPSS, 2007). Descriptive analysis was performed for the demographic data, particularly the age and LOS of the patients, using the mean, median, and standard deviation (SD). In addition, descriptive statistics using percentages were used to summarise all the demographic variables, and to calculate the overall prevalence rate, including the rate in each ward. The prevalence was also calculated both including and excluding grade one.

Different inferential statistical tests were used depending on the nature of data. The study population was split into two groups: (1) patients with and without PU, or (2) patients at risk or not at risk of PU (according to Braden). Since the data were not normally distributed, non-parametric tests were used. In the first group split, the Chi-square test was used for dichotomous variables to examine the difference between patients with PU and those free from ulcers by hospital, specialty, and gender. For the same groups, the Mann–Whitney U-test was used for the ordinal variables, such as the age and LOS of patients with and without PUs. The second group split concerned risk status according to the Braden scale. In this round, the Chi-square test was used to examine whether there was any difference between risk status and incontinence level. A P-value of 0.05 was deemed statistically significant.

3.35 STORAGE OF THE RESEARCH DATA

The participants in the two studies were informed about the aims of collecting the data. This was stressed in the PISs and in the verbal explanation. They were assured that the data would be confidential and would be used in an anonymous form so that no identifiable data would be released directly or indirectly. Each participant or organisation was given a unique code number; no names were used at any stage. All the data were saved in the researcher's university network and accessible only with a password known only to the researcher. Thus, destruction, theft, amendment or accidental damage of the data was safely prevented. Data backups were taken and stored in a locked fire proof cabinet in a safe location. After the research project has been completed and the qualification awarded, the hard copies of all data, including personal data, will be shredded. The soft copies will be held securely by the University for the purposes of academic research. No raw data collected in the UK will leave the UK.

3.36 SUMMARY OF METHODS

This chapter was divided into two sections detailing two studies. The first concerned how PU data is recorded and utilised in clinical settings, and the second was interested in gathering PU data itself. The aim was to highlight PU prevalence, risk assessment and prevention procedures in Jordan. Study One was further divided into two phases, each one involving a separate method.

The QUAN phase of Study One aimed to obtain data about PU. This mirrors the first step in the Nelson framework which was used as a theoretical framework to guide the study. The data which the questionnaire endeavoured to collect was the prevalence rate, how it is calculated, the frequency at which PU audits are conducted, and who performs these audits, in addition to the RAS and GS used in practice, and the type of system used to record PU data. The questionnaire was designed carefully and tested to amend any inconsistencies. Then, two sites were identified - the TVS and the NHS - and, after all ethical approvals were granted, the questionnaire was distributed to TVNs belonging to these organisations. Many actions were taken to maximise the response rate from these settings. After the data was collected, it was analysed using the appropriate test depending on the level of the data.

The QUAL phase of Study One was initiated to complement and explain some of the results of the QUAN phase. Its aim was to collect data about how PU data is recorded in different recording systems, the pros and cons of these systems, how PU audits are conducted, how cases of PU are reported and referred to TVNs, and, finally, how the collected data is used. This final aim represents the last circle in the Nelson framework (2002), where the appropriate use of Knowledge that based on data is said to lead to 'the wisdom'. A semi-structured interview format was deemed appropriate to address the research questions. The interview schedule was carefully designed. It was impossible to test the reliability of the semi-structured interviews, but all measures were taken to minimise threats to validity. For example, a pilot interview was conducted with the first interviewee. The interviewees were selected from the QUAN phase sample, by way of an invitation being provided at the end of the QUAN questionnaire for participants to

respond to if they were willing to be interviewed so that the results could be followed up. Sixteen willing interviewees were chosen and the data was saturated at this level. It was decided to collect field notes rather than a verbatim transcript since this was considered sufficient for being able to address the research question and appropriate to the template analysis approach used. In this style of analysis, prior knowledge about the research should be available, and that was provided by the QUAN phase of the study.

Study Two utilised a descriptive, cross sectional point prevalence design to collect prevalence, risk assessment and prevention data in two hospitals in Jordan. This study was a methodological replication of the EPAUP study so that valid, reliable and comparable results could be obtained. Data was collected in Jordan after ethical approval was granted by all parties. All patients suitable with respect to the inclusion criteria were examined for PU by the researcher. Any ulcers found were graded according to the EPUAP classification system and the Braden scale was used to assess the patients' risk of developing PUs. Data on prevention measures was recorded as well and the patients' medical records were used to collect some secondary data, such as demographic information. Finally, all the data was entered and analysed using the SPSS.

In summary, the methods needed for this research project have been discussed in detail in this chapter, where each separate method used was presented in the relevant section. In the next chapter the same approach will apply, where the results of each method will be presented separately. The QUAN and QUAL results will be treated as two separate phases in the same study, and the prevalence survey results will be presented in a separate section as a distinct study.

CHAPTER FOUR:

RESULTS

4.1 A QUICK GUIDE TO THE CHAPTER

This chapter is divided into two main sections. The first presents the results of Study One, which was conducted in the UK, and the second presents the results of Study Two, conducted in Jordan.

The Study One results are further divided into two phases so the QUAN and QUAL results of this study are presented separately.

The QUAN results offer information about the types of organisation which participated in the study, the prevalence rate in these organisations, and the methods used to calculate the reported rate. In addition, the findings tell us who are responsible for carrying out audits in the different settings and how often they are conducted. Moreover, the RASs and GSs used in the different settings are summarised. The types of recording systems used to record PU data are presented as results of this phase.

Subsequently, the QUAL findings complement the QUAN results and help to explain them more thoroughly. For this phase, the results are organised according to the themes that emerged from the data, as guided by the template that was used to interpret the findings. These are, namely: the type PU data collected; the manner in which PU data is recorded using different recording systems; the pros and cons of these recording systems; the reporting and referral of PU cases to TVNs; the procedures for conducting PU audits; and, finally, the uses of the collected and recorded PU data.

As regards Study Two, the results of the prevalence survey are presented, including the risk assessment and prevention data.

Study One Results (UK)

PHASE I: QUAN RESULTS OF STUDY ONE

4.2 SAMPLE NUMBERS:

The total number of TVNs who completed the questionnaire was 216. After reviewing the responses, 167 of these were judged to be clean responses which could be analysed (Figure 4.1).

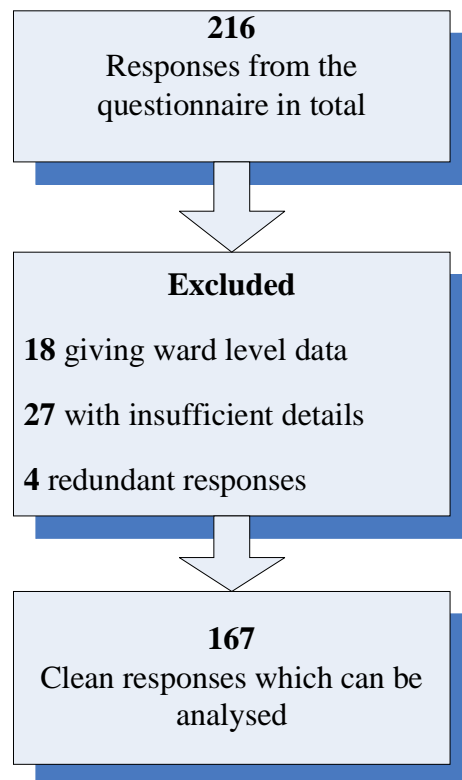


Figure 4.1 The study sample numbers

The excluded responses were categorised into three groups. The first to be excluded were a small percentage of the respondents who offered ward level data (8.3%

=18/216), while the majority (77.3%) gave organisation level data. Since the topic needed to be investigated broadly and in general, and since each ward has different characteristics, it was decided to exclude this small percentage.

The second group excluded were those who gave insufficient details. In other words, some respondents only filled in one or two items of the questionnaire and left the remainder blank. Since these responses could add nothing to our understanding of the topic, they were also chosen to be excluded.

The last group excluded were those who completed the questionnaire twice. Measures were taken to reduce redundancy as much as possible, especially because the data was collected from two sites, and some of the TVNs working in the first, the NHS are also registered with the second, the TVS. The questionnaire was only sent out once to each organisation and/or TVN and, in the e-mail invitations, it was emphasised that, if the TVN had filled in the questionnaire previously, then they should ignore the message. After these measures were taken, the responses were scanned and the data file was reviewed using the SPSS (SPSS, 2007), so that any identical responses could be removed. In the end, just four redundant responses had to be deleted.

4.3 FLOW OF DATA

The flow of data in the questionnaire was as follows (Figure 4.2): First, each organisation supplied a prevalence rate, which should have been based on a particular method of calculation (e.g. prevalence survey, audit, etc), and which in turn would be used at a particular frequency. Next, the question of who conducts the method could be examined, before establishing what RAS and GS are used for carrying it out, as it is acknowledged that prevalence audits, or any PU audit, involve these two elements. Finally, it was important to know where all the data is recorded.

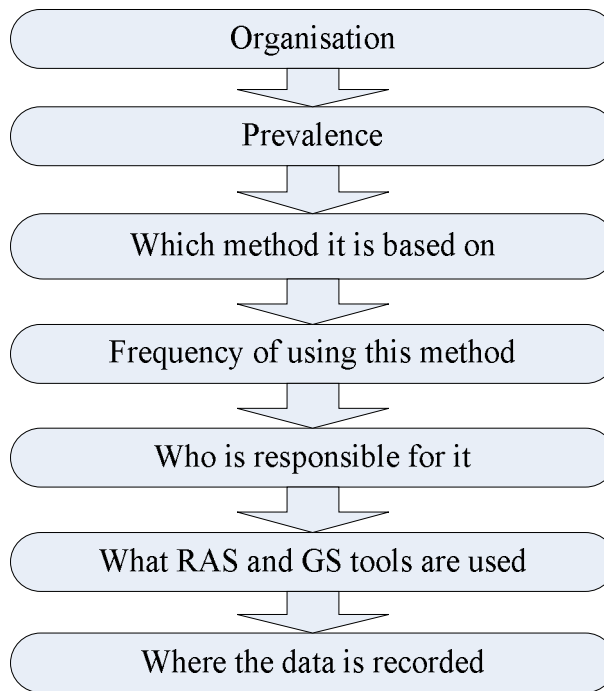


Figure 4.2 Flow of data in the questionnaire

4.4 PARTICIPATING ORGANISATIONS

In this questionnaire, two major categories of settings were present, acute settings and community settings. The respondents from the acute settings all came from hospitals, while from the community settings, respondents could be seen to belong to one of three categories: nursing homes, community hospitals, or community caseloads. The last category was not one of the questionnaire choices but was a label invented to cover any primary care setting other than the nursing home or community hospital. It thus includes health centres, local PCTs, patients' own homes (home visits), DN caseloads and practice nurse caseloads.

In general, the secondary setting represented by hospitals was the most common category to participate in the survey (56.9%, $n = 95$), while the primary settings accounted for 43.1% ($n = 72$) of the sample. These included, from the largest to smallest, the community caseloads, nursing homes, and community hospitals. (Table 4.1).

Table 4.1 Questionnaire results summary

Questionnaire Items	Number (%)
Type of organisation	
Hospital	95 (56.9%)
Community caseload	44 (26.3%)
Nursing home	17 (10.2%)
Community hospital	11 (6.6%)
Prevalence rate	
Hospital	(3.5-23%)
Community caseload	(0.5-25%)
Nursing home	(1-11.1%)
Community hospital	(5-15.6%)
Method of calculating prevalence	
Prevalence survey	75 (44.9%)
Clinical audit	45 (26.9%)
Routine paper-based report	25 (15%)
Electronic patient record (HIS)	11 (6.6%)
No record kept for audit data at all	11 (6.6%)
Frequency of conducting audits	
Weekly	3 (1.8%)
Monthly (12 times/ year)	37 (22.6%)
Five-annually (5 times/year)	4 (2.4%)
Quarterly (4 times/ year)	15 (9.1%)
Tri-annually (3 times/ year)	2 (1.2%)
Bi-annually (2 times/ year)	16 (9.8%)
Annually (1 time/ year)	67 (40.9%)
Performed irregularly	9 (5.5%)
Not performed at all	11 (6.7%)
Clinician responsible for PU data	
TVN	105 (63.6%)
TV link nurse	20 (12.1%)
Ward nurse	19 (11.5%)
Nurse manager	18 (10.9%)
Company	3 (1.8%)
RAS	
Waterlow	142 (88.8%)
Braden	18 (11.2%)
Grading scale	
EPUAP	132 (83%)
NPUAP	9 (5.7%)
Stirling	10 (6.3%)
Torrance	3 (1.9%)
Do not use one	3 (1.9%)
Do not know	2 (1.3%)
Type of record	
Paper record	69 (42.1%)
Electronic record	16 (9.8%)
Combination of both	79 (48.2%)

4.5 PREVALENCE DATA

The prevalence rate was given by more than two-thirds of the sample (72.5%, n=121) (Table 4.2).

Table 4.2 Number of organisations which provided a prevalence rate

Organisation	Give prevalence N (%)	No prevalence data N (%)	Total
Hospitals	80 (84.2%)	15 (15.8%)	95
Community caseloads	17 (38.6%)	27 (61.4%)	44
Nursing homes	16 (94.1%)	1 (5.9%)	17
Community hospitals	8 (72.7%)	3 (27.3%)	11
Total	121 (72.5%)	46 (27.5%)	167

There were a number of respondents (n=46, 27.5%) who did not provide the requested prevalence data (Table 4.2). However, most of them provided explanations for this in the text space provided in the questionnaire. A content analysis of these explanations was performed, which is summarised in Figure 4.3. Eleven responses declared clearly that no audit was conducted in the organisation in question for the reasons explained in Figure 4.3. The other responses indicated that audits were conducted in these organisations, but not for the prevalence. The primary care settings were the most likely to not report this data (31/46= 67.4%). This could be because these settings do not record the data or even collect it, or it may be for any of the reasons given in Figure 4.3. Amongst all the other primary settings, the community caseload group gave the highest number of this type of response (27/46= 58.7%).

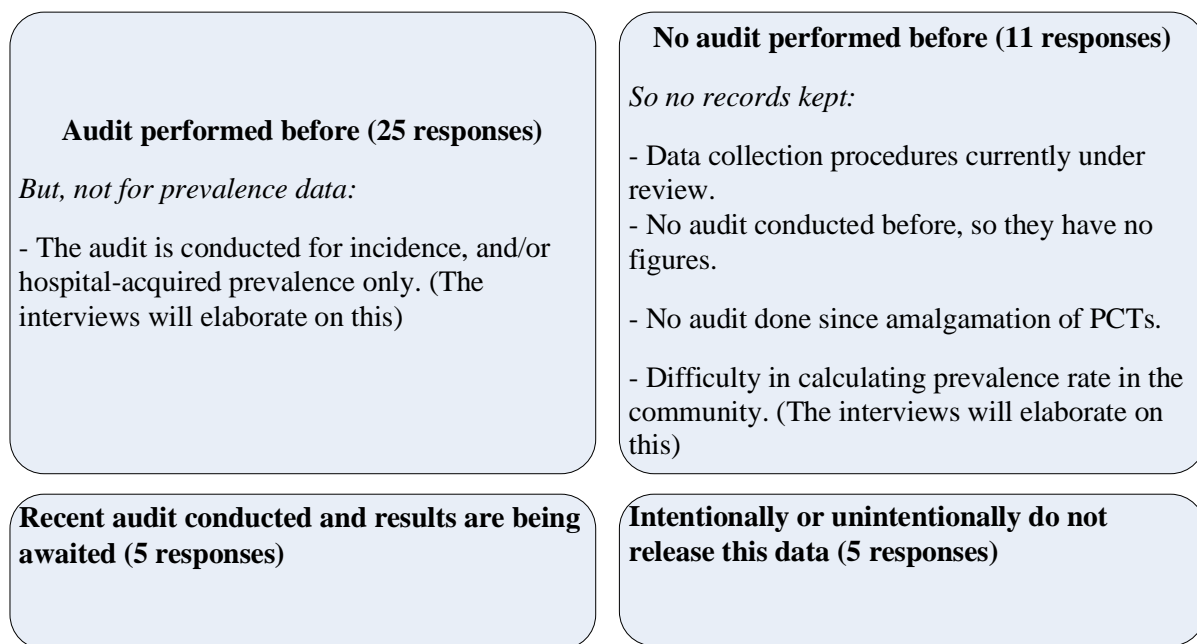


Figure 4.3 Content analysis of the text space responses provided in the questions

The prevalence rate in all settings ranged from 0.5% to 25%, as reported in the questionnaire. Since the data were not normally distributed, the results are presented using the median and Interquartile range (IQR). The median prevalence rate was 7% (IQR=5.2). The Kruskal-Wallis test shows that there was a significant difference in the prevalence rates of different organisations ($X^2=20.59$, $df=3$, $p<0.001$). Therefore, the prevalence of each organisation will be presented separately.

4.5.1 Prevalence in acute settings (hospitals):

The prevalence rate in hospitals has the highest median in the sample. The range was between 3.5% and 23%, with a median of 8% (IQR= 5.2). However, a portion (15.8%, $n= 15$) of the sample do not record or collect PU prevalence data (Table 4.2), could record only incidence, or hospital-acquired prevalence (Figure 4.3). The questionnaire could not explain the reasons behind this, but the QUAL phase of the study was expected to do so.

4.5.2 Prevalence in the community caseloads:

The prevalence ranged in the community caseloads from 0.5 to 25%, with a median of 3.7% (IQR= 7.5). Again, this phase of the study was unable to explain the huge range in this setting, and for this we have to rely on the QUAL phase to provide further elaboration. As mentioned earlier, most clinicians from this category did not provide the prevalence rate (Table 4.2).

4.5.3 Prevalence in nursing homes:

The prevalence ranged from 1% to 11.1%, with a median of 4.3% (IQR= 5.6). All but one of the respondents from this setting supplied the prevalence rate (Table 4.2). The explanation for the one failure to provide information here could be any one of the possibilities in Figure 4.3.

4.5.4 Prevalence in community hospitals:

In the community hospitals, the prevalence ranged from 5% to 15.6%. The median was 7.4% (IQR= 6.8). Out of the eleven respondents, three did not report a prevalence rate (Table 4.2).

4.6 METHODS OF CALCULATING PREVALENCE RATE

To ensure better understanding of this section, an operational definition is given for some key terminology to describe the different types of methods used as follows:

Prevalence survey: any survey conducted by the TVN, or any clinician dealing with wound care in the organisation, to collect quantitative data about PU whose main purpose is to establish the prevalence.

Clinical audit: any work done to evaluate the PU problem in general, which may include, but is not limited to, collecting information on prevalence, incidence, preventive care provided by the nurses, equipment, care plans, and how PU patients' files are reviewed. Thus, audits are more generalised than the specific prevalence surveys meaning that, in this case, the prevalence rate would be one, but not the only, area of interest.

Paper reports: the conventional paper-based records of the patients. The figures come from reviewing the routine paper records, and do not depend on survey or audit results.

Electronic records: the electronic-based records of the patients. The figures are obtained through reviewing electronic records, such those available in the hospital information support systems (HISS).

No record (kept for any audit data at all): this category was added after the responses were reviewed. It was not available as a choice in the questionnaire, but the respondents may have written it in the text space provided. In this category, only those who do not conduct an audit in their organisation are included. Although there were 46 respondents who did not give the prevalence rate, only eleven came from this group. The others do use some sort of audit, but not for calculating prevalence.

The prevalence rates provided by the questionnaire respondents were based on different methods (Table 4.1). The prevalence survey was the most common of these (44.9%, n=75), followed by the clinical audit (26.9%, n=45). This means that more than two thirds (71.8%, n=120) of the reported prevalence rates came from either prevalence survey results or clinical audit findings.

A comparison was carried out between the different types of organisations and the different responses to the questionnaire using appropriate statistical tests. Since the numbers of the community settings was small, and it is difficult to run some statistical tests on small numbers, the data was put into two larger categories for this purpose only: 'Primary settings', which contains data from community caseloads, nursing homes and community hospitals and 'secondary settings' which contains data from the hospitals only. This was done to make testing the differences between these settings possible; otherwise this would have been impossible to calculate.

Indeed, there was a significant difference between the primary and secondary settings in the methods used for calculating PU prevalence, as the Chi square test showed ($X^2=33.5$, $df=4$, $p<0.001$). The prevalence survey was the most common approach used for calculating PU prevalence in the secondary care settings, i.e. hospitals (62.1%, $n=59$), while in the primary settings this was not the case (Table 4.3). The nursing homes and community hospitals depended on reviewing paper records and/or a clinical audit, while the clinical audit was the most common method employed in community caseloads (38.6%, $n=17$).

Table 4.3 Methods of calculating PU prevalence rate in different settings

Setting	Prevalence survey N (%)	Audit N (%)	Paper report N (%)	Electronic record N (%)	No record N (%)
Hospital	59 (62.1%)	17 (17.9%)	9 (9.5%)	8 (8.4%)	2 (2.1%)
Community caseload	12 (27.3%)	17 (38.6%)	5 (11.4%)	1 (2.3%)	9 (20.4%)
Nursing home	2 (11.7%)	7 (41.2%)	7 (41.2%)	1 (5.9%)	0 (0%)
Community hospital	2 (18.1%)	4 (36.4%)	4 (36.4%)	1 (9.1%)	0 (0%)

4.7 FREQUENCY OF CONDUCTING PU AUDITS

The frequency of performing PU audits which assess prevalence varied. Most commonly they were undertaken on an annual basis (40.9%, $n=67$), and this was followed by monthly (22.6%, $n=37$) (Table 4.1). There were a small percentage who did

not perform audits on a regular basis (5.5%, n=9), or do not perform them at all (6.7%, n=11). Both of these categories were added in light of the respondents' answers on the questionnaires.

Again, the primary and secondary settings differed with regard to the frequency at which they conducted PU audits (Fisher's Exact test=18.18, p=0.010). The annual PU audit was most commonly performed in both hospitals and community caseloads (46.7%, 43.2% respectively) (Table 4.4). The community hospitals mainly stated either monthly or annual frequency (36.4% each) while the nursing homes usually carry out PU audits on a monthly basis (47.1%).

Table 4.4 Frequency of conducting PU audits in different settings

Setting	Weekly N (%)	Monthly N (%)	Five- annually N (%)	Quarterly N (%)	Tri- annually N (%)	Bi- annually N (%)	Annually N (%)	Irregular N (%)	Not done N (%)
Hospital	0 (0%)	18 (19.6%)	3 (3.3%)	9 (9.8%)	2 (2.1%)	12 (13%)	43 (46.7%)	3 (3.3%)	2 (2.2%)
Community caseload	1 (2.3%)	7 (15.9%)	0 (0%)	2 (4.5%)	0 (0%)	3(6.8%)	19 (43.2%)	3 (6.8%)	9 (20.5%)
Nursing home	2 (11.8%)	8 (47.1%)	1 (5.9%)	2 (11.8%)	0 (0%)	0 (0%)	1 (5.9%)	3 (17.5%)	0 (0%)
Community hospital	0 (0%)	4 (36.4%)	0 (0%)	2 (18.1%)	0 (0%)	1 (9.1%)	4 (36.4%)	0 (0%)	0 (0%)

4.8 CLINICIANS RESPONSIBLE FOR PU AUDITS

Operational definitions are also needed in this section to help avoid any confusion:

TVN: qualified clinician in the area of wound care and tissue viability; responsible for developing care plans for PU patients, auditing PU data and conducting prevalence and incidence surveys.

TV link nurse: the local wound expert in each ward, who usually receives training in TV viability from the TVN, and acts as a contact point between the TV office and his ward. The link nurse can give training to the staff nurses in his ward, and can carry out prevalence surveys.

Ward nurse: the staff nurses who work in the wards but do not necessarily have training in TV.

Nurse manager: this could be the nurse manager in nursing homes, the head nurse of a ward in a hospital, or the nursing matron or director in an organisation.

Company: the company which provides preventive equipment for organisations, usually having a contract to provide such services. They can also conduct a prevalence survey by themselves or in conjunction with the TVN and the ward nurses.

The TVN was most commonly the clinician responsible for PU auditing (63.6%, n=105) (Table 4.1). Others, such as TV link nurses, ward nurses, nurse managers and the company which provides the preventive equipment, can also audit PU, but do so much less frequently.

The clinician normally responsible for PU audits also differs between the primary and secondary settings, as the Chi square test confirmed ($X^2=17.7$, $df=4$, $p=0.001$). The TVNs were the most common clinicians responsible for PU audits in both hospitals and community caseloads (70.5% and 81%, respectively). In nursing homes the nurse manager was the most common person to undertake them (64.7%), while in the community hospitals the ward nurses were responsible for PU auditing (Table 4.5).

In fact, the company which provides the preventive equipment was only available to the hospitals, where they audit PU either alone or in collaboration with TVN there, as the interviews later on made clear.

Table 4.5 Clinician responsible for PU audit in different settings

Setting	TVV N (%)	TV Link Nurse N (%)	Ward Nurse N (%)	Nurse Manager N (%)	Company N (%)
Hospital	67 (70.5%)	14 (14.7%)	7 (7.4%)	4 (4.2%)	3 (3.2%)
Community caseload	34 (81%)	5 (11.9%)	2 (4.7%)	1 (2.4%)	0 (0%)
Nursing home	1 (5.9%)	0 (0%)	5 (29.4%)	11 (64.7%)	0 (0%)
Community hospital	3 (27.2%)	1 (9.1%)	5 (45.5%)	2 (18.2%)	0 (0%)

4.9 RISK ASSESSMENT SCALES IN USE ACROSS ORGANISATIONS

As the questionnaire results show, the most common RAS used in the UK was the Waterlow RAS (88.8%, n=142). The Braden scale was less frequently used in the UK (11.3%, n=18) (Table 4.1). There was no significant difference between the primary and secondary settings in terms of the RAS used (continuity correlation= 2.21, df=1, p=0.137), meaning that the Waterlow RAS is the most common one used across all settings (Table 4.6).

Table 4.6 Using of RASs in different settings

Setting	Waterlow scale N (%)	Braden scale N (%)
Hospital	80 (85.1%)	14 (14.9%)
Community caseload	36 (92.3%)	3 (7.7%)
Nursing home	16 (94.1%)	1 (5.9%)
Community hospital	10 (100%)	0 (0%)

4.10 GRADING SCALES IN USE ACROSS ORGANISATIONS

Many GSs were shown to be in use (Table 4.1), but the most common one was the EPUAP GS (83%, n=132), followed by the Stirling scale and NPUAP, 6.3% (n=10) and 5.7% (n=9) respectively. A small percentage of organisations use Torrance as a GS (1.9%, n=3). A small number of respondents said either that their organisation did not use a GS (1.9%, n=3) or that they did not know whether they use a GS or not (1.3%, n=2). The EPUAP grading system was also the most common one used across all settings (Table 4.7).

Table 4.7 Using of grading scales in different settings

Setting	EPUAP N (%)	NPUAP N (%)	Stirling N (%)	Torrance N (%)	Do not use N (%)	Do not know N (%)
Hospital	88 (97.8%)	1 (1.1%)	1 (1.1%)	0 (0%)	0 (0%)	0 (0%)
Community caseload	31 (73.8%)	3 (7.1%)	5 (11.9%)	1 (2.4%)	1 (2.4%)	1 (2.4%)
Nursing home	7 (41.2%)	4 (23.4%)	2 (11.8%)	1 (5.9%)	2 (11.8%)	1 (5.9%)
Community hospital	6 (60%)	1 (10%)	2 (20%)	1 (10%)	0 (0%)	0 (0%)

4.11 TYPE OF RECORDS AVAILABLE FOR PU DATA

The complete electronic recording of PU data was the least prevalent method (9.8%, n=16) while a combination of both paper and electronic records was the most frequently used system for recording data (48.2%, n=79) (Table 4.1). The chi-square test results show that primary and secondary care settings differed in the type of records they use ($X^2=7.22$, df=2, p=0.029). This is because all the settings use a combination of records, except the nursing homes where they depend largely on paper records (Table 4.8). The community hospitals were the only organisation that did not use electronic records at all.

Table 4.8 Different types of records for PU data in different settings

Setting	Paper records N (%)	Electronic records N (%)	Combination records N (%)
Hospital	35 (37.6%)	14 (15.1%)	44 (47.3%)
Community caseload	20 (46.5%)	1 (2.3%)	22 (51.2%)
Nursing home	11 (64.7%)	1 (5.9%)	5 (29.4%)
Community hospital	3 (27.3%)	0 (0%)	8 (72.7%)

PHASE II: QUAL RESULTS OF STUDY ONE

The interviewees have here been given a unique identifier, from 1 to 16, and are also identified by their settings, primary or secondary, and the type of records they use, either paper, electronic, or combination (Appendix D1). A comparison is made between the primary and secondary settings in some relevant subcategories. The quotations that are used to clarify the TVNs' accounts are labelled at the end by [subject's profession as TVN; unique identifier; type of organisation; and the type of recording] for easy referencing.

The quotations provided in this study are based on field notes and not on verbatim transcripts. The exact words of the interviewee are not crucial as it is the meaning behind the words which is important (Stake, 1995). Being able to restructure the interviewees' accounts and present them in research characterises a good interviewer (Stake, 1995).

The final template presented in Figure 3.6 (Chapter 3) which was created from the data will be used to interpret the findings of this phase of the study. The findings were categorised into themes presented in separate sections. The first aim was to explore the type of PU data collected by the nurses, then to discover how these data are recorded. After that, the way that PU cases are reported and referred to TVNs would be investigated and the methods of conducting PU audits, including prevalence audits, in different settings explored. Later, the different uses of PU data were looked at and, finally, the advantages and disadvantages of the recording systems were explored.

4.12 PU DATA COLLECTION

Patients in different healthcare settings should always have some sort of data recorded in their files which gives a clear picture about their condition. PU patients are no

exception and each one should have data recorded in his file, regardless of what type of file that is. PU data is collected and recorded either by a TVN or the field nurses (the latter is a term coined by the author to refer to both the ward nurses in secondary care settings and the community nurses in the primary care settings). According to all interviewees, the PU data that is collected and recorded can be categorized as follow (Figure 4.4):

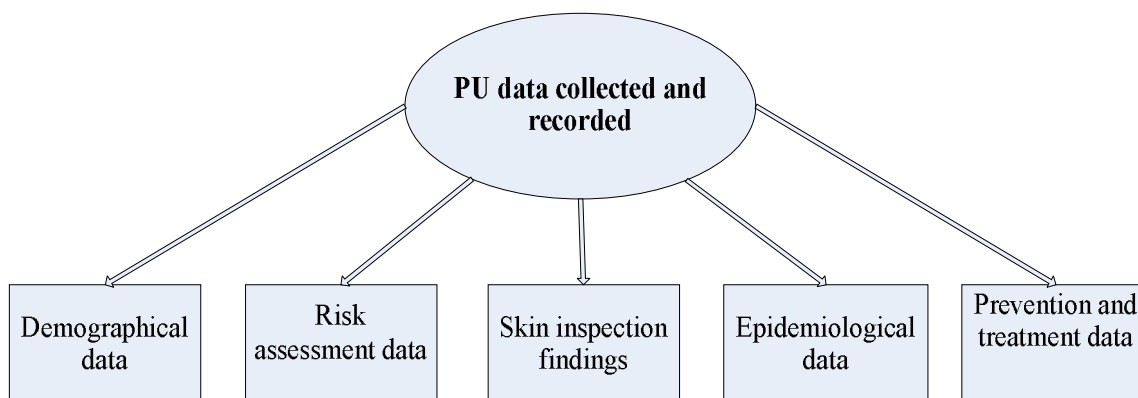


Figure 4.4 PU data recorded by nurses

- Demographical data: patients' name, age, gender, date of birth, NHS number, date of admission.
- The assessment data:
 - *Risk assessment*

The majority of TVNs reported that any patient admitted to an organisation should be assessed for PU risk using a validated tool ('organisation' is a term the author gives to all participating settings in the study, either primary or secondary). Consistent with the questionnaire findings, most of the interviewees confirmed that their organisations used Waterlow as a RAS to assess risk level. Some TVNs, especially those in the secondary settings, agreed that risk assessment should be performed as early as possible, with some of them suggesting that they should be carried out within six hours of admission.

The risk assessment should be repeated on a weekly basis until discharge, when transferred or when a patient's condition or mobility changes. However, this may depend on the ward that the patient is based in. One TVN mentioned that patients should be assessed daily in acute wards and weekly in lower risk wards, such as rehabilitation or post-operative.

In primary settings, there was a slight difference in respect of risk assessment due to the nature of these settings, where the patients, especially in the community caseloads, visit surgeries as outpatients and do not stay. In these cases, the patients' risk is also assessed when they are seen by the community DN, and at follow-up appointments. All TVNs in the primary settings agreed that the person who was responsible for PU cases in community caseloads was the DN.

The patients in both the nursing homes and those of community hospital nurses were assessed in a way which is similar to those in the secondary settings, since they are also inpatients.

- *Skin inspection findings:*

If a patient has no ulcer, it is enough to document only the risk level. However, according to a number of interviewees, if the patient has PU, more data will be collected and recorded. The number of ulcers should be recorded, in addition to a description of each ulcer found, detailing, for example, the location, grade, size, depth, width, colour, necrosis, origin as well as the date it was identified. Some TVNs agreed that a photograph should be taken and documented with the other data on the patient's file.

- *Epidemiological data:*

Most TVNs in both settings (i.e. primary and secondary) collect some epidemiological data relating to prevalence or incidence or both. Information about the method and frequency of the audits and the clinicians who conduct them was easily obtained from the QUAN study. However, it was not clear from this data exactly how these audits were conducted and, consistent with the aim of the mixed methods approach, it was expected that the QUAL part of the study would help shed light on this.

- Prevention and treatment component:

A significant proportion of the TVNs believed that prevention plans for patients who are at risk of ulcers should be recorded as part of PU data. In addition, any prevention measures taken, such as turning, the use of certain equipment, dressing and dietician referrals, should be recorded as well. The same applies to a management or treatment plan used to treat an existing ulcer.

The above data should be collected by the nurses in all settings for each PU patient and should always be documented; there is no point in simply collecting the data without it being entered on patients' records. PU data can be recorded in: paper records, electronic records, or a combination of the two types of record. Sometimes the organisation employs electronic recording systems for some types of data but not for that relating to PU cases, which is still recorded on paper. In these cases, the study notes the recording system as paper records. In other cases, the opposite occurs; the organisation as a whole uses a paper records system, while the TV department records PU data electronically. These cases are listed as using electronic records. The next section explains how the collected PU data is recorded by the nurses and TVNs.

4.13 RECORDING OF COLLECTED PU DATA

Three related activities which were identified (and defined) from the interviews were recording PU cases, reporting these cases and, finally, referring them. 'Recording' refers to the documenting of all information related to particular cases, such as the patients' demographic data and ulcer related data. All PU data should be recorded in the patients' files. The second key term is 'reporting', which refers to the nurses in the wards or other settings reporting PU cases to a TVN (some organisations follow specific guidelines for this process, such as specifying that cases which are grade 2 and above should be reported). There could be some confusion between the previous two terms, since they are interrelated. To clarify, PU cases should be recorded on patients files, whether they are reported or not. Reporting is to inform a TVN about the cases, for the

sake of the TVN's records and knowledge, but not to seek help. The final term is 'referring', which does mean that a TVN's professional help is sought. Here, the nurses refer cases which they are unable to treat to the TVN (sometimes specific guidelines are applied for this; for example, grade 3 and 4 PU cases should be referred). In summary, all the cases should be recorded and documented on the patients' records; all, or perhaps only some, of these cases should be reported so that the TVN is aware of them; and some, but certainly not all, PU cases can be referred to the TVN for advanced help.

In this sample, three out of sixteen TVNs use a paper system to record PU data, another three of them use an electronic one and the remainder (n= 10) record PU data in a combination system (Appendix D1).

4.13.1 Recording of PU data using paper-based systems:

In this type of system, both the nurses and the TVNs use paper records (Figure 4.5). According to the TVNs interviewed, it is the field nurses who inspect the patients and assess their level of risk. The risk assessment scores and skin inspection results should subsequently be recorded on the patients' paper records. If the patient is found to have PU, the nurse will record all PU data on the patient's usual paper file.

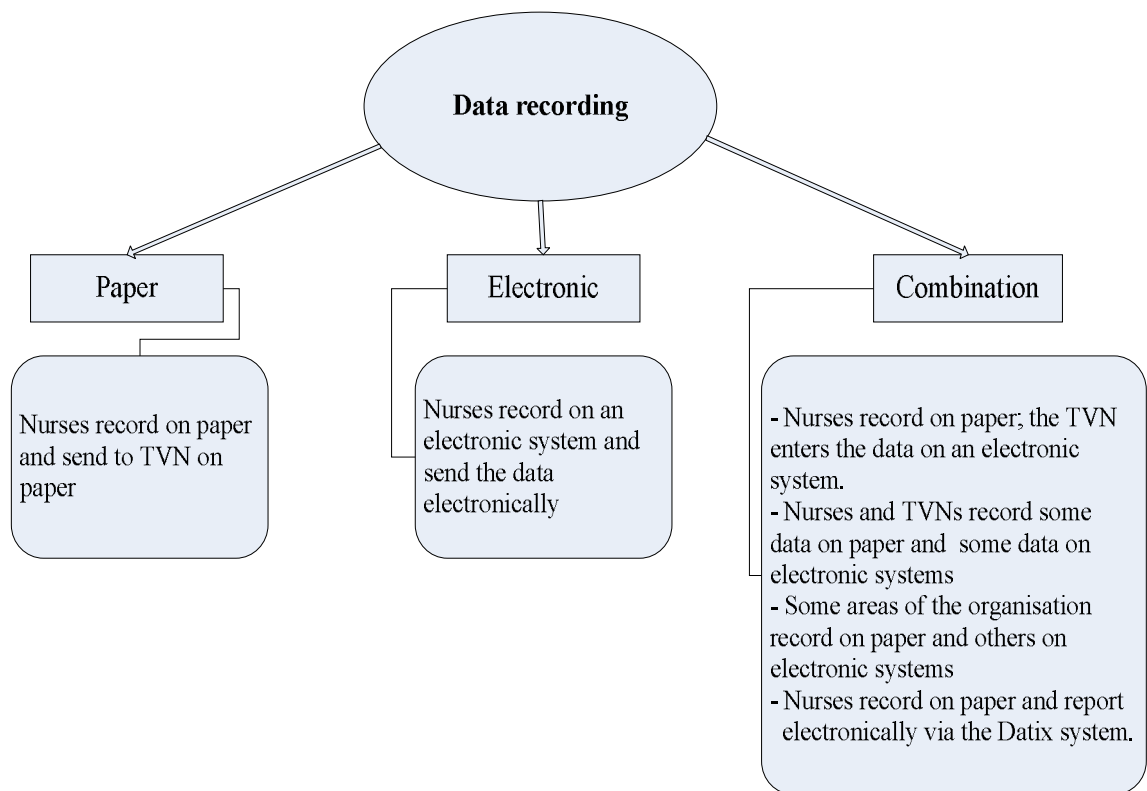


Figure 4.5 PU data recording in different systems

4.13.2 Recording of PU data on electronic-based systems:

In this arrangement, both the nurses and the TVNs record PU data on an electronic system (Figure 4.5). In these cases, when a patient comes to the organisation and is assessed to have PU, all patient data and ulcer related information is recorded by the nurses on a central electronic system, which the TVN and staff from the TV office also have access to so they can check the data and follow the patient up. This is extremely useful in the primary settings, where many sub-settings are part of the same organisations. The only TVN from the community settings who used this complete electronic recording system for PU data declared:

“The recording of this data is done on electronic central system where I can view all PU cases from all the PCT settings at the same time as the data is actually recorded, while I am sitting at my desk”.

[TVN 3, primary setting, electronic recording]

One of the most important features of these recording systems, as stressed by the three TVNs who use them, is the electronic reporting of PU cases. That is, when the nurses record PU data on the system, this is also an automatic means of reporting and referring electronically. The TVN can directly view the data and give guidance if required.

4.13.3 Recording of PU data using combination-based systems:

The last recording system of was a combination of the above two systems, which is used in different care settings (Figure 4.5). Four separate combination models emerged from the data, and these are summarised in Appendix D2.

The first model was used by those who are in a transition stage between the two systems, which means that they currently record on both systems. Two TVNs from the secondary settings were experiencing this process (Appendix D2). In these examples, the organisations are moving towards adopting an E-system, but the ward nurses need to receive training on the electronic system for a period of time before the system is fully transferred. The nurses record PU data on a paper system and record some of the data on the electronic one, depending on how the training is progressing. One of the TVNs interviewed receives the paper forms on a monthly basis (28th), which summarise all the PU cases admitted or having occurred that month. The other TVN receives a paper form when grade 2 cases and above are developed or noticed. Both of them check the electronic system and try to insert any missing details into the data after reviewing the forms. Thus, both the nurses and the TVNs have the experience of two systems; they use paper and electronic system at the same time.

The second model was when the nurses record all PU data on a paper system but, if they would like to report or refer a PU case, they record this on an electronic clinical incident reporting system (called the Datix system). They are therefore also using a combination format, involving both the original paper records, and the electronic reporting system. Using this system, the reports are sent immediately to the TV office. Since the TVN can have information about the cases as long as they are recorded on the system, help can easily be provided if sought. A report can be generated immediately either for the nurse that filled in the form or for the TVN.

The third model was the most common form of combination system found. According to the interviewees who use this type of recording, only the TV office has an electronic recording system and the nurses still use a paper system. In the secondary settings, two of the six TVNs that use a combination system for recording use this type of combination (Appendix D2). In these settings, the ward nurses record all PU data on the usual paper records, and on a special paper form that is sent to the TVN. The latter review all this data, process and enter it into a computerised system, specially used by the TV department.

Three out of four community TVNs use this form of combination system, and the same procedure as detailed above is followed in their settings. One community TVN (TVN 6) reported that only the community DN records and reports PU data. The community hospitals have their own separate system and, for the meantime, do not collect data from the nursing homes, which have only recently started to collect PU data. In this example, the DNs record PU data on paper records and then send these reports to the TVN on monthly basis. The TVN enters this data on a database, especially for use within the TV office.

The other two community TVNs emphasised that they receive the data from the DNs and the community hospital nurses, while the nursing homes in both cases have their own separate recording systems. One of them mentioned that when there is a grade 2 or above case it is recorded and reported as a “significant event”. Both said that a specific paper form is completed and sent to the TVN and that it is then stored on an electronic database available only to the TV department. Subsequently, the TVN can collate the data from all settings, and produce monthly reports for the organisation’s board. On all these forms, the origin of the ulcer is recorded to decide whether it came from the hospital or from the community.

The last combination model, which was unique to the primary settings, uses different types of recording systems in different sub-settings of the organisation. One TVN who had experience of this method mentioned that all patients who visit the community settings and are found to have grade 2 ulcers and above, are recorded as clinical incidents. The way that this type of incident is recorded varies between settings,

however. The DN assesses patients either in the clinical settings (i.e. GP surgeries) or in the patients' own homes. If any ulcers are identified, an online digital form is filled in, which states all the details of patients and their ulcers using the Datix system. In the nursing homes and community hospitals, the staff send a monthly paper report to the TVN where all data can be collated. Consequently, the TVN is made aware of developments on a monthly basis, unless there are any particularly complicated cases which need her help. Thus, in this case, mixed methods are used to record PU data as one part of the organisation record on paper and the other complete records electronically, which means that this TVN receives the data in both formats.

To sum up, the way that PU data is collected and recorded in primary and secondary settings is largely similar. The only difference is with the person who records this data, but the procedures followed are the same. In secondary settings, ward nurses record data for the patients in their wards and then send it to the TVN either in paper or in digital format. The TVN in these settings collates the data which comes from the wards of one or more hospitals, depending on the size of the organisation. In the primary settings, the community nurses, either the DNs in the community caseloads (i.e. GP surgeries or patients' own homes) or the nurses in both the nursing homes and community hospitals, record this data and send it to the TVN in both formats as well. The TVNs in the local PCTs collate data which comes from all the settings connected with their organisation, which might be much larger than an acute organisation, since community hospitals, nursing homes, and all other community settings may fall under its control. Appendix D3 summarises the recording of PU data in both settings.

After the data is collected and then recorded, using any of the methods, the same method could be used as a means of reporting and/or referring. In other words, the nurses, through recording PU data, can report a PU case to the TVN or even refer the case for further help and advice. The following section will discuss how and when PU cases are reported or referred to the TVN.

4.14 REPORTING AND REFERRING PU CASES TO THE TVN

4.14.1 Reporting:

There are two ways field nurses can report to TVNs, either by the traditional paper-based reporting method, or electronically (Figure 4.6).

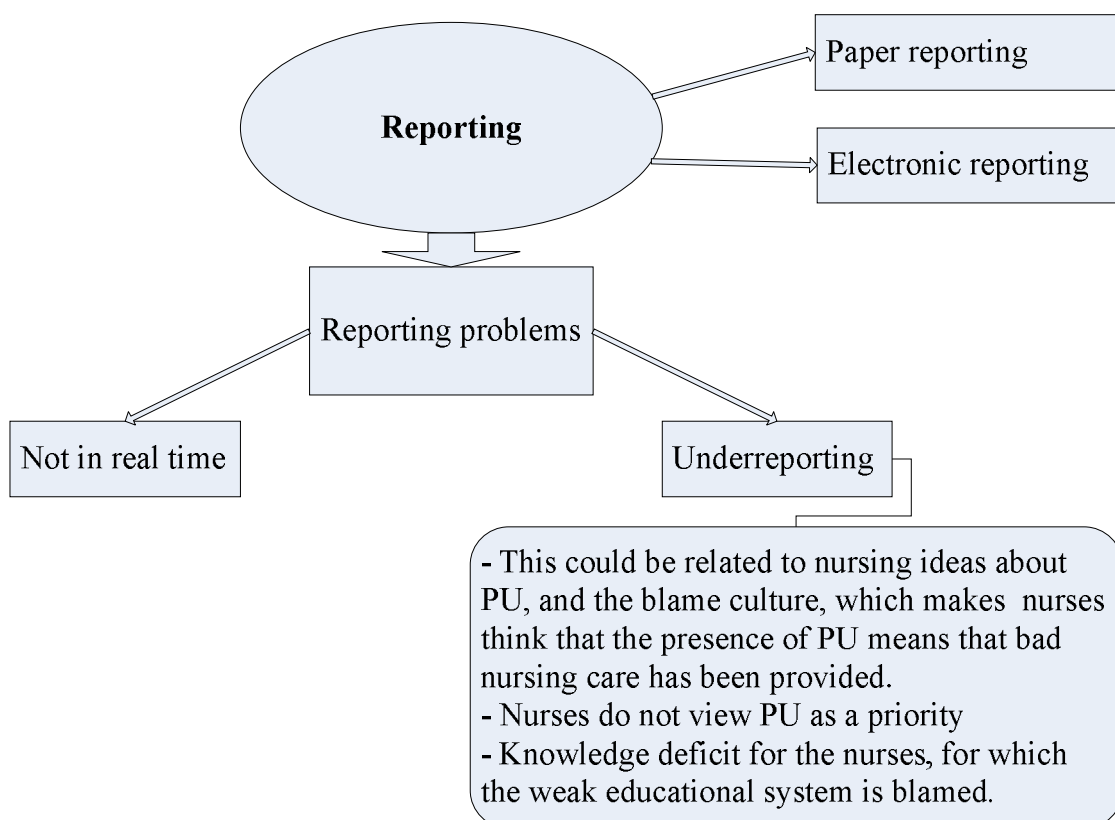


Figure 4.6 Type of reporting and reporting problems

4.14.1.1 Paper reporting:

Most of the TVNs interviewed from the different care settings declared PU cases were usually reported through paper reporting. According to those TVNs, the field nurses should record PU data on patients' records and send paper reports to the TVN at predefined intervals, except for when the TVN's help is required, in which case they can ask for advice and refer the case as soon as it occurs or is admitted in the secondary

settings, or seen the primary settings. These paper reports have several names. Most of the TVNs call them clinical incident forms, and only one TVN referred to them as significant event forms. Regardless of the name of these forms, however, all of them carry the same information and message to the TVN. The TVN can learn of the number of patients with ulcers, the number of ulcers each patient has and their characteristics, as well as the demographical data from these forms. The forms can be sent by fax, or the TVN can be informed about the cases by telephone, pager, messages left on the TV office answer machine or sometimes by email.

Most TVNs in the primary settings agreed that reports were sent to the TV office, at their most frequent intervals, monthly, while in the secondary settings, the nurses report on a weekly or monthly basis to the TVN. The exceptions, in the two organisations, are in those cases when the nurses use electronic reporting and report directly onto the system, as the case develops or when a new patient is admitted with PU.

Nine out of sixteen TVNs said that a clinical incident form, or another type of reporting form, is filled in when a patient has grade 2 PU and above (Appendix D4), as per the NICE (2005) guidelines. The remaining TVNs confirmed that these forms should be completed in relation to all instances of PU, including grade one cases.

4.14.1.2 Electronic reporting

In the secondary settings, four organisations have an electronic reporting feature in their systems (Appendix D4). According to two TVNs who belong to organisations which use a completely electronic system, when PU develops or when a patient is admitted with PU, this can be recorded on the system immediately and the TVN can become aware as soon as it is recorded. This could be crucial in referring cases in which the TVN's professional advice is needed to prevent further destruction of the ulcer. The other two TVNs use a combination system, but their organisations use electronic clinical reporting systems to report PU cases (Appendix D4).

In the primary settings, two of the TVNs interviewed also use this feature (Appendix D4). The first one uses a complete electronic system where the electronic reporting feature of the system is enabled. The other TVN uses a combination system, where only

the community DNs can report PU cases to this TVN via a central electronic system which is connected to the TV office. In both cases, the TVN can learn about the PU cases as soon as they are reported on the system, and can follow the patients up on the system.

The remainder of TVNs who use a paper reporting system, however, believe that the presence of such a system makes matters easier. The nurses can report PU cases by simply clicking a mouse instead of filling in a long paper form and having to wait to send this form to the TVN. Many of these TVNs also believed that, if the nurses report PU cases on the system when they occur, this will mean that the TVNs are informed about them in real time, creating a chance for early initiation of individualised care plans, which could lead to improvements in the care provided to patients.

4.14.2 Reporting problems

Two main problems seem to exist in the process of reporting. The first one relates to the timing of reporting. Although one TVN mentioned that the reporting of PU cases within 4-6 hours of their occurrence should be the aim of all organisations, there was a general consensus among the TVNs that most of ulcers were not reported as quickly as this.

The second important problem was the underreporting of PU cases by the nurses. The gross majority of TVNs from different care settings agreed that PU cases tend to be underreported. One example of this view came from a TVN who stressed that nurses do not report all PU cases:

“... they report only the most advanced, complicated cases, with the biggest and worst ulcers, in order to obtain advice when they can’t deal with the case themselves and need help...”.

[TVN 4, Primary setting, combination recording]

The same TVN gave an example of underreporting in his organisation:

“... after reviewing the system in the last reporting slot that was based on the nurses’ reports I found that only 46 PU cases were reported from all the PCT settings.... our PCT covers a population of around 600,000 people... so this is something unbelievable”.

[TVN 4, Primary setting, combination recording]

There are many reasons that appear to affect the reporting according to this interviewee, who clearly suffers from this problem in his settings:

“... this underreporting may relate to the nurses’ belief that they live in a blame culture and the presence of such ulcers will be blamed on their substandard care. For this reason, they prefer not to report cases”.

[TVN 4, Primary setting, combination recording]

This TVN criticized the underreporting practice, and emphasised that some patients with ulcers will be neglected because of this, and will not receive the professional care they need. If this discovered, it should lead to safeguarding procedures being put in place and further investigation being carried out.

Furthermore, one TVN blamed the phenomena of underreporting on the lack of adequate education and training available to the nurses. This TVN thought that the nurses underreport PU cases because they do not have enough knowledge of PU and of how it should be prevented. According to this TVN, more TV courses should be added to the nursing curriculum in universities and colleges.

Another TVN emphasised that the problem of underreporting presents mainly in superficial cases. This TVN outlined her experience in discovering underreporting when nurses ask for equipment. Because certain items have to be requested through her, she can check whether or not a significant event form has been filled out.

4.14.3 Referring

The TVN should be aware of all PU cases in all the care settings he or she is responsible for. This allows him or her to keep an up-to-date record of PU cases in the organisation, to prescribe some preventive devices and to assess and offer interventions in some cases. The first two of these can be achieved by reporting, and the third by referring. TVNs do not inspect all PU patients in wards for two main reasons. The first is due to the high number of inpatients and outpatients in primary and secondary settings, and the fact that sometimes there may only be one TVN, or one small team of TVNs, to cover many wards, settings or hospitals. As a consequence, in these cases the TVN can follow up only the most severe grades of PU. Secondly, the nurses in most settings receive some sort of TV training by the TVN so that they can carry out many of the duties themselves and need to refer only the most complicated cases to the TVN. Figure 4.7 explains the process of referring a PU case to a TVN.

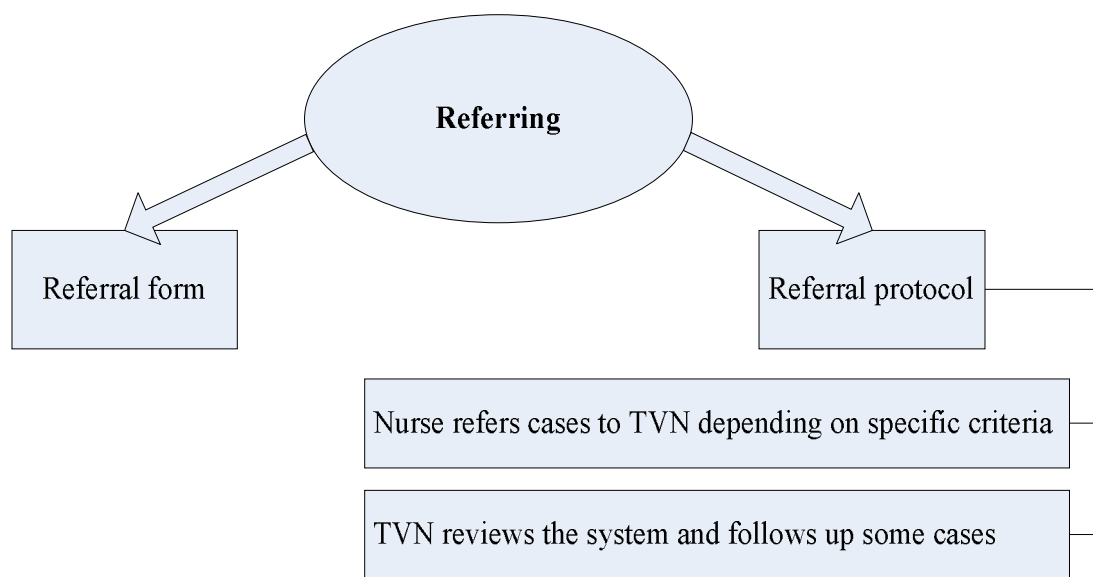


Figure 4.7 Referring a PU case to a TVN

Some TVNs follow a protocol for referral, as illustrated in Appendix D5. These guidelines involve cases which are thought to require individualised care plans and equipment since, in many organisations; it is the responsibility of the TVN to make

decisions relating to these needs. A significant proportion of TVNs said that they only deal with the most complicated, unhealed ulcers, which are mainly grade 3 and 4. There are others, however, who follow up all cases, starting from grade 1 or 2 up to grade 4.

One TVN explained:

“...when there is a complicated case, where the standard care doesn’t work, then they refer this case to me”.

[TVN 2, primary setting, combination system]

Another TVN affirmed:

“I see all grade 4 ulcers and most, but not all, grade 3 ulcers”.

[TVN 5, primary setting, combination system]

Only two out of the sixteen organisations use a specific referral form (Appendix D5). In this form, all patients’ demographic and ulcer-related data should be recorded, as well as details on the current management plan. In addition, it should also be specified whether the patient was admitted with the ulcer. However, the majority of the TVNs confirmed that their organisations do not use a specific form use the recording and reporting methods as a means of referral as well. Those TVNs review the records which are built up from the nurses’ reports and note whether there are any cases of grade 3 and 4 PU which need to be followed. This means that a paper system was used for both the reporting and referring. Since all cases which should be referred should be reported, but not all cases reported should be referred. Those who use electronic reporting procedures will also refer the cases to the TVN electronically, via the same system. The TVN can then review the system and follow cases as directed by the referral guidelines. There is therefore no need for the nurses to refer specific cases to the TVN. They must simply report all cases of PU and the TVN will follow them up according to the particular protocol in place.

“The nurses do not refer any cases to me; I can automatically follow up certain cases by reviewing the system to personally pick out all grade 3 and 4 PUs”.

[TVN 6, primary setting, combination recording]

Some TVNs explained that, when all the referral requests from the field nurses are received by the TV department, they can then determine their priority. According to the same TVNs, interviewed most cases are seen within 24, 48 and 72 hour depending on the severity of the case. The most urgent referrals tend to be seen within 24 hours, and non-urgent cases between 24 and 72 hours.

4.15 HOW PU AUDITS ARE CONDUCTED

Four major categories emerged from the data regarding the conducting of PU audits in different care settings (Figure 4.8).

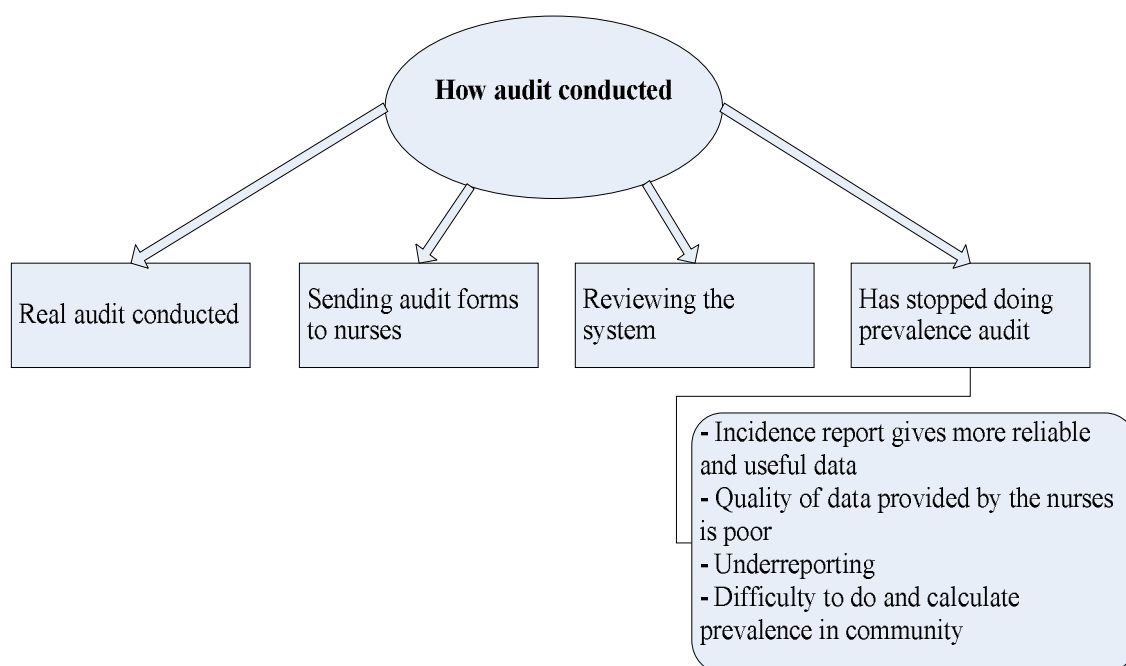


Figure 4.8 How audit conducted

- **The first method:**

Only three out of the sixteen interviewees followed the first method for conducting PU audits, which is the real audit, conducted at a specific time (Appendix D6). This is undertaken by the TVN himself, who examines the patients in wards to collect the data. The link nurses in the wards or the company that provides the organisation with equipment may help in conducting the audit. In these cases, all the auditors design the survey questions and conduct the survey together. The link nurses' knowledge of the wards is useful for collecting specific information about the patients because they tend to know them well. The nurses fill in an audit form for each patient and, subsequently, the TVN checks it for any missing data. All forms are collated and a report will be generated at the organisational level.

- **The second method:**

Many TVNs use the second method in different care settings. In this case, the TVNs send the audit questionnaires to the field nurses. These audit forms require certain information to be filled in by the nurses, such as number of PU patients in the settings, total number of patients in these settings, date of admission, date of identifying PU, Waterlow score on admission and when PU identified, all ulcer-related information (size, location, grade, origin), preventative care or treatment provided (positioning, mattresses, cushions, dressing type). The nurses complete these forms regarding an agreed period of time, and return them to the TV office, where the TVN can review the questionnaires, collate the results and produce a PU audit report for that period.

- **The third method:**

The third method is the most straightforward, since the audit is carried out by simply reviewing the TV department's existing paper or electronic records. The data is obtained from the nurses on a regular basis, and the TVN can then collate all the data and generate a report on a specific date. The audits can be calculated on a weekly or monthly basis depending on the recording frequency.

- **The fourth method:**

The most interesting finding in respect of how audits are conducted was that there were some TVNs who had discontinued undertaking audits or collecting PU prevalence data altogether. To be precise, four TVNs out of the sixteen, two from each setting, had stopped undertaking prevalence audits. When asked about the reasons for this, the TVNs said they feel that incidence data gives more reliable, powerful and relevant information. One TVN described collecting prevalence data as pointless:

“...the last prevalence study I did it was four years ago. This is because I did twelve consecutive studies and nobody looked at the prevalence data that was collected, so I concluded that it was worthless”.

[TVN 10, secondary setting, electronic recording]

The same idea was expressed by another TVN:

“...collecting prevalence data is absolutely useless, it has no value”.

[TVN 1, primary setting, paper recording]

The reason for the worthlessness of prevalence data, according to the above TVN, is that the quality of data provided by the nurses was poor. They usually underreport PU cases and, even when they do report them, they tend not to report cases on time and often diagnose the PU grade inaccurately. Moreover, the data is useless because she is unable to allocate equipment to the patients, and there can be no benefit of generating a prevalence report as long as this is the case.

The other community TVN who had stopped calculating prevalence said the difficulty of calculating prevalence in the community was the reason for this, as will be illustrated in the next subsection.

4.15.1 How the prevalence rate is calculated:

A difference between the primary and secondary settings in respect to how prevalence rates are calculated is apparent. In the secondary settings, the calculation of prevalence rates is straightforward, and is obtained by dividing the number of PU patients found in the hospital over the total number of patients in the hospital on that day. The rate can be provided by each ward and the TVN can collate the data from different wards to produce a prevalence report for the whole organisation.

In the primary settings, the calculation is more problematic. The community organisations cover a huge number of settings and large populations, which means it is difficult to calculate the prevalence, and the problem of underreporting makes the figures inaccurate. In addition, the presence of PU patients in nursing homes and community hospitals, who are also considered part of the community, complicates things further. In fact, community hospitals and nursing homes are no different from the secondary settings in terms of the principles applied; the difference is in the community DN caseloads. According to the community TVNs, there are two ways to calculate the prevalence rate in these settings.

The first method is to establish the prevalence of PU in the entire community covered by that organisation. However, the TVNs in the study reported many shortcomings of this method. They argued that the rate obtained in this way is inaccurate, since huge numbers of healthy people are involved in the calculation, and this lowers the rate unreasonably.

The second method is to calculate the prevalence rate in the DN caseload. The problem is that this figure does not represent the whole community, since only those registered in the DN caseload are involved in the calculation. There are many patients who do not fall within the DN's remit, such as those who receive care in their homes from their families and do not attend surgeries, and those who receive treatment as hospital outpatients. Patients with PU belonging to these groups would not appear on the records, thus affecting the accuracy of the data.

4.16 USES OF RECORDED DATA

This section presents the uses of PU data in general, although sometimes the use of specific data, such as prevalence and incidence data, will be given (Figure 4.9).

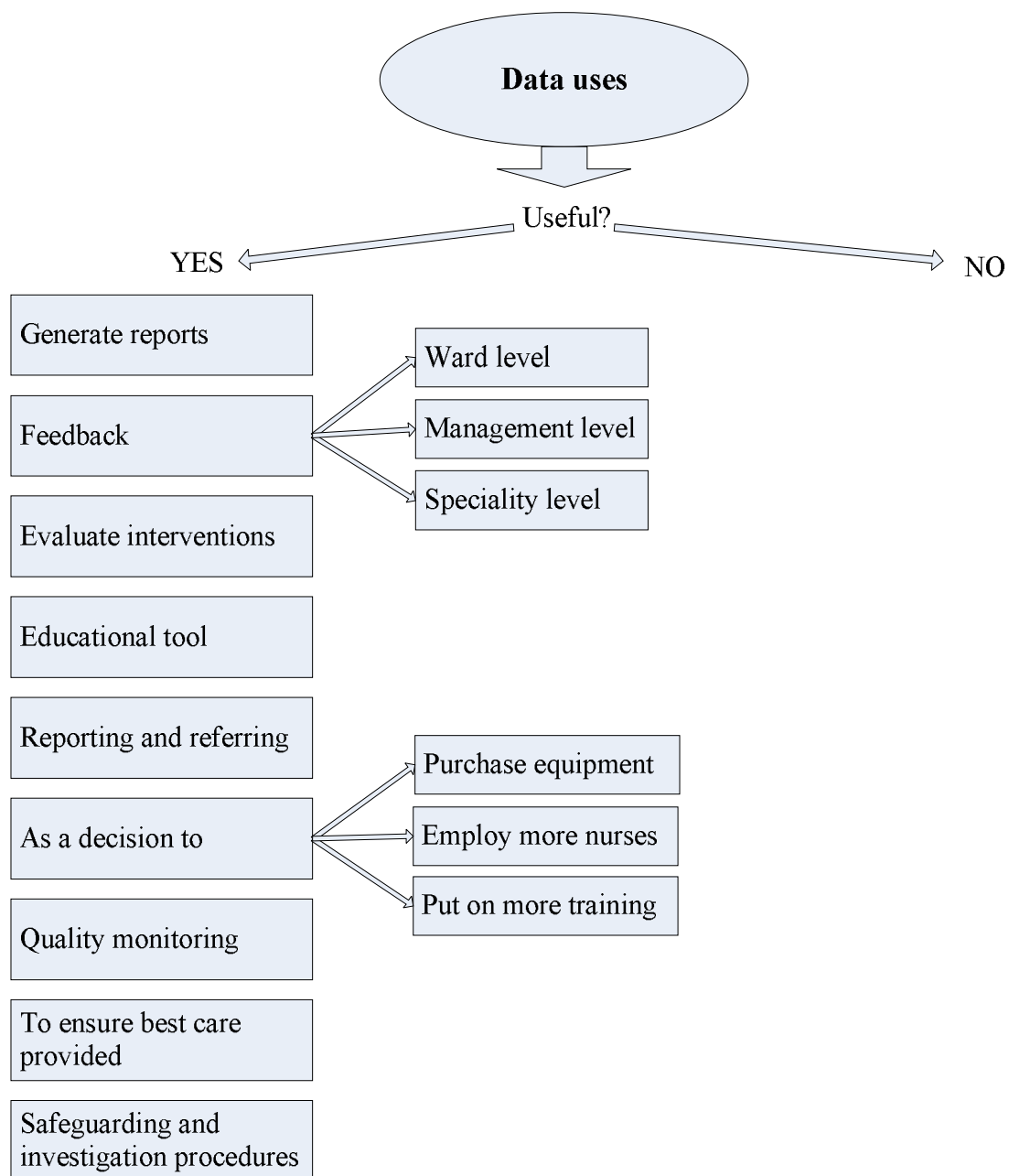


Figure 4.9 PU data uses

The majority of the TVNs from both settings judged collected PU data, including prevalence data, as useful (Appendix D7). However, there were four TVNs (two from each setting) out of the sixteen interviewed who had discontinued collecting prevalence data. One of these four think it is difficult to collect this data in the community settings, and the remainder thought that the data was useless, for the reasons mentioned before.

Even those TVNs who had stopped collecting prevalence data, however, still have a record of all PU patients in their organisation and data related to patients' ulcers. This information by itself could be tremendously useful according to those TVNs. It can be presented in a general report at the organisation level, and may be influential in improving the care provided to PU patients, especially when the trend in PU patient numbers is shown.

Others believe that general or prevalence data specifically about PU could be useful in several ways:

1- Generate reports:

All TVNs agreed that data collected about PU and all related information can be useful to generate regular reports from their systems, whether they are electronic or paper-based. The data which comes from different field nurses can be used to generate prevalence or incidence reports over any predetermined or required period. Some of them generate these reports on a monthly, quarterly, or annual basis.

According to the TVNs who do so, these reports are of great help, since they can inform them about the number of PU patients in each ward or setting, the number of ulcers each patient has, the characteristics of these ulcers, and the prevention measures undertaken for the patients most at risk. This is of particularly great advantage in the primary care settings, where there are many separate sites, but one report can be produced to summarise the cases in all of them.

One TVN mentioned that this data, and especially the prevalence and incidence data, can be used to observe trends over time, especially if conducted on a regular basis,

enabling the organisation to track the performance of their staff, since the presence or absence of PU is used as a quality indicator.

2- Feedback

There was consensus that the reports generated by the systems can be used as feedback at ward, organisational or speciality level:

a- At ward level:

The nurses receive the data through the link nurse or via their head nurse. They will see the size of the problem in their wards, if there is a high prevalence or incidence rate, and this could trigger them to improve the quality of care provided to the patients by implementing individualised care plans. The reports and data can be useful when an ulcer has been successfully avoided, as valuable lessons can also be learnt from this, as it may increase their understanding and improve their application of intervention.

b- At management level:

Many TVNs confirmed that those operating at management level, such as the trust's board, nursing matrons and nursing directors, can use the facts which are obtained by the PU audits to make decisions. In fact, the TVN can often use the data as a tool to convince the management to purchase further preventive devices and equipment. When there is high incidence or prevalence in a particular organisation, and the preventive devices available are not enough to cover all the patients who require them, this will be taken as evidence that new devices such as mattresses are needed.

Another use for the data at the management level that emerged from the interviews is its role in helping to inform staffing decisions. Some TVNs mentioned that the reports (especially the ones which contain high prevalence and incidence figures) could be used as a way to highlight the need for more nurses in specific areas of the organisation.

Several TVNs believe that the data has another use at this level, namely for quality monitoring. The administration in all kinds of care settings can use this data, the prevalence and incidence data in particular, as a quality indicator.

c- At specialty level (TVN)

A significant proportion of TVNs report that they themselves can benefit from the data which is collected on PU cases. They can use this data to plan the care provided to PU patients and, in turn, ensure that these care plans are implemented by the nurses, and then evaluate the actions taken. Moreover, the TVN can prioritise cases according to the data provided by the nurses and arrange to deliver preventive equipment to those most in need of it.

The last use for the data by the TVNs is that it enables them to identify the areas of highest incidence so that they can pay extra attention to these areas, by increasing the number of preventive devices provided to them. These areas of the high incidence invite certain questions to be asked, such as about why the situation has arisen and where the TVN should investigate, and sometimes safeguarding procedures take place as a result. In other circumstances, the TVN may discover that the nurses in this area need more training on PU and its prevention, and then appropriate training can be organised.

3- Evaluate interventions

Many TVNs confirmed that data can be used to evaluate interventions. In the example of incidence data, the effectiveness of certain interventions can be clearly evaluated. The results of the regular prevalence audit can be used to discover if the prevention program has been followed or not.

4- Educational tool

According to some TVNs, the nurses should be involved in conducting PU audits as a means of undergoing training in how to grade ulcer and assess the risk of developing ulcer in the patients.

5- Means of reporting and referring

The vast majority of the TVNs interviewed believed that data recorded by the nurses could be used as a reporting and referral method. When the nurses record PU data in real time of occurrence this enables the TVNs to quickly view the recorded data on

either electronically or on paper, so that they can then follow up the most complicated cases. Clearly, this is of great use to the TVNs and the patients, and subsequently the organisation.

4.17 ADVANTAGES AND DISADVANTAGES OF DATA RECORDING SYSTEMS

Both primary and secondary care settings utilise three types of recording systems for PU data. They record on paper systems, electronic systems, or a combination of the two. TVNs who use the third type of recording have experience of both the paper and electronic systems so they can comment broadly on each. Furthermore, some TVNs interviewed had worked in a paper-based hospital and then moved to one which uses an electronic system, so they also have the two experiences and can comment on both as well.

For the purpose of simplification, and in fitting with what the interview content revealed, this part will be divided into two sections, where the advantages and disadvantages of each system will be presented. The combination system will not be given separately since it is made up of both paper and electronic systems, and a standalone combination system does not exist. Figure 4.10 summarise the advantages and disadvantages of each recording system.

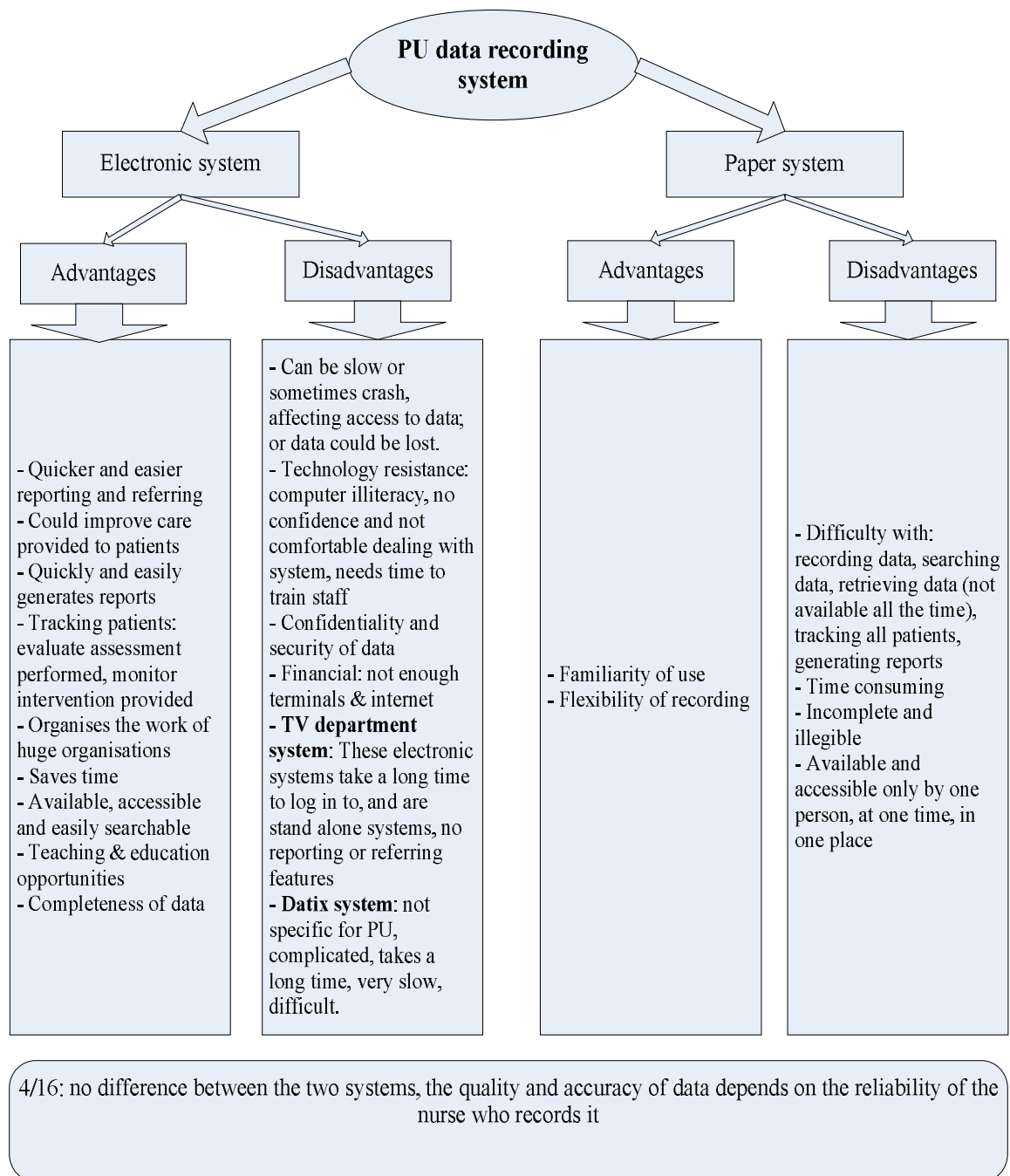


Figure 4.10 Advantages and disadvantages of PU data recording systems

➤ **Electronic system**

• **The advantages:**

This section presents the issues which TVNs believed, through their experience, to be advantages of the electronic recording of PU data. All interviewees who used electronic or combination systems of recording contributed to this area of the research. Some paper system users also commented speculatively on this subject, even though they did not themselves have relevant experience.

1- Electronic reporting and referring:

TVNs who had experience of this feature in their complete electronic system, explained that when the nurses record PU cases on the system at the time of their development, the TVN can view the case immediately. In other words, it is used as a system for reporting, and at the same time for referring, since the TVN can be asked for immediate help through the system or can follow the cases that need to be followed, according to specific guidelines. One TVN clarified:

“I can easily check the system and see if new cases have been reported and/or referred to me”.

[TVN 10, secondary setting, electronic recording]

Another TVN from the primary settings added:

“the nurses can just record and document PU cases on our central system, which I can review on a regular basis, and automatically follow up grade 3 and 4 PUs....., I think that this is better than waiting for paper referral forms to be sent by the nurses.”

[TVN 3, primary setting, electronic recording]

This TVN's thoughts were in harmony with another from the primary settings who was due to begin using the full version of the electronic system within the next eight months. This TVN believes that electronic reporting will be quicker and easier because it will be

constantly available to the nurses and will be less time consuming than filling in long paper forms for reporting or referring.

2- Improving the care provided to patients:

Many TVNs who use electronic systems suggested that the above advantages in turn entail other advantages. If the reporting is achieved more quickly and easily using such systems, this means that the TVNs will receive data swiftly and can therefore intervene quickly, especially in cases which need urgent help. The TVN can provide a full assessment of the patient, to determine the necessary equipment and prevention measures, and design the care plan. It can then be ensured that the care plan is implemented by the nurses and the interventions can be evaluated.

“...reporting PU cases onto the system immediately after their occurrence enables me to follow up these patients quickly, which will also foster the beginning of a prevention program, especially if a case is reported as soon as there is redness or a grade one”.

[TVN 8, secondary setting, combination recording]

3- Generating reports:

The TVNs can generate reports through an electronic system, and these reports can be used as feedback. When the nurses record PU data on the system, a database is built up for the TVNs. Through these huge databases, the TVN can generate prevalence and incidence reports for the organisation. This can be done quickly, easily and accurately by using such a system.

4- Tracking the patients:

When PU patients' data is entered into the system, the TVN can easily track the patients from admission until discharge, and is able to access certain important facts about the patient, such as noting whether they develop new ulcers or not, monitoring the intervention provided (which should be recorded on the system) and evaluating the assessment that is performed for each patient. All these actions can be carried out

electronically without having to complete any paperwork. One TVN from the primary settings who uses a completely electronic system in the community settings affirmed:

“It is much easier to track PU patients through this central system. You can ensure better care plans are provided for the patients, and can identify where sores originated and in which settings they occur the most ...”

[TVN 3, Primary setting, electronic recording]

Another TVN from the same type of organisation, who was to start using the full version of the electronic system in the next eight months, thought that the system would make it easy to track all PU patients in all the community settings connected to their organisation by virtue of the fact that all these settings would be linked together, and information would be delivered to him directly. This TVN believes that, because his organisation is huge, it is very difficult to manage by a paper system. By using an electronic system, this TVN will be able to know the number of PU patients in the organisation, the care plans provided, patient history, the number of patients visiting, and the total population that is covered by this organisation. Nurses also can attach PU photographs when they want to ask for professional help from the TVN. Moreover, this system will be linked to other hospital systems, which means that the TVN can, for example, also access information on patients' laboratory test results, medication, and nursing documentation.

5- Saves time

There was consensus from most the TVNs who use the electronic system, that it can save both the field nurses' and the TVNs' time. The field nurses can enter all PU data electronically by typing on the keyboard, instead of filling in long paper forms, and they can also send the data to the TVNs just by clicking the mouse. The TVNs can easily generate reports by taking a few steps using the system, instead of manually calculating of cases or reviewing paper forms. They can also quickly and easily track any patients using the system.

6- Availability and accessibility of the data:

A significant proportion of TVNs mentioned that the data is readily available, even after the patient is discharged. In the case of paper records, it is more difficult because the files are archived and need to be specially requested, particularly after the patient is discharged. Moreover, specific data in a patient's file can be easily located by electronically searching this record. This is more difficult for patients whose records are held completely on paper.

" ... Imagine that you are wanted to know the serum albumin level for a PU patient measured when he was admitted two months earlier.....If the data is not missing from the patient's paper file, it would be quite difficult to retrieve this bit of information, especially if the patient has had several admissions and his file keeps getting thicker."

[TVN 8, secondary setting, combination recording]

Several TVNs underlined the fact that the electronic system of PU data is easily accessible at any time from any location in the organisation by more than one healthcare team member at once. In a paper record system only one person at a time in one particular place can access the information.

7- Teaching and education of staff / Quality and completeness of the data

It was reported that the electronic system can be used as a tool for teaching nurses. This was explained by one TVN as taking place when the nurses enter some components of PU data like the assessment, particularly since some of this information is mandatory. This system does not allow the nurses to move from one data field to another without them having filled in the previous field. Connected with this, then, is another possible advantage of the electronic system over the paper system: the completeness of data. The mandatory fields mean that a complete and comprehensive patient record will be ensured. In the paper forms, the nurses are not obliged to record all elements of PU data.

The above idea was emphasized by a community TVN who uses a paper record system. The TVN thought that the electronic system would be more advantageous only if it meant the implementation of a clever system that had mandatory fields which force nurses to make a full assessment of PU for each patient. This would enhance the quality

of the recorded data. Otherwise, this TVN thought that there would be no difference between an electronic system and a paper one.

- **The disadvantages:**

Despite the above advantages, the interviewees were also readily able to identify some possible disadvantages relating to the electronic system:

- 1- Technical and technological problems:

These kinds of issues were identified by the TVNs interviewed as one of the major drawbacks of this system. The staff nurses are sometimes reluctant to adopt the electronic recording of PU data due to the possibility of technical and technological problems, such as the fact that the system can be shut down when there is a problem, which in turn will affect access to the data in patients' files.

Some TVN stressed that access to the data through such systems requires certain infrastructure, such as computers and internet connections, which may make them difficult to adopt. Many organisations do not have enough terminals from which data can be accessed or the systems may be of limited use to those who do not have internet connections. This is due to financial problems as identified by some of the interviewees.

Most of the TVNs that have electronic systems only in their own departments but not in the nurses departments explained some disadvantages of such a system. These systems are often simple systems, to which it takes a long time to log in to (half an hour in some cases). Given that the process is so time consuming, they are often uninterested and try to avoid using them. Moreover, such systems will be standalone, and not connected to other hospital facilities, which means that the TVNs have only the information which they enter from the forms sent to them by nurses and nothing else. They cannot view, for example, the laboratory test results, medications or the diagnostic procedures used for the patients. Moreover, they believed that the absence of the electronic reporting feature in their systems makes the reporting process lengthy and difficult. Another

problem is that reporting cannot be achieved in real time of occurrence, especially since some ulcers require immediate intervention.

The TVNs who use the Datix system to report PU cases complained that this system is a general system used to report any clinical incidence and is not specifically designed for PU. The system is difficult to deal with because it is complicated, not specific, it can take a long time to log in and it is very slow. Although, the system has a feature of self generating report, these are merely a summary of each individual case, and not a general report that involves all cases. If this was needed, manual collating of the data would have to be carried out.

2- Computer literacy:

Most TVNs agreed that the majority of nurses they deal with are middle aged or older and that these groups are not familiar with the computerised system and may feel uncomfortable using it. This may restrict the benefits of using this kind of system. One TVN elaborated:

“...most of the nurses are computer illiterate; they are terrified of using computers and haven’t the confidence to sit in front of them,... they have a fear of losing the data when dealing with such a system, ...so, for such nurses, entering the data will be difficult and can cause them distress.”

[TVN 9, secondary setting, paper recording]

3- Time consuming:

Some TVNs confirmed that these systems can require more of the nurses’ time because most of them are sophisticated and require training on their use. However, this need to practise consumes a lot of the nurses’ time and is a problem in the clinical settings, where most of their time needs to be directed towards patient care.

4- Confidentiality and security of the data:

One TVN mentioned that another disadvantage to the electronic system is that the confidentiality of patients could be breached by anyone who has access to the data.

Moreover, the security of the data could be threatened since anyone in the healthcare system has access to it.

➤ **Paper system**

This section explores the issues which TVNs experienced or thought to be possible advantages and disadvantages of the paper recording of PU data.

All respondents agreed that the most commonly noted advantage of the paper record is its familiarity of use. The nurses in different settings are familiar with paper records, they are not intimidated by them and they can record freely without the computer phobia that some TVNs mentioned was a challenge for the electronic system. Moreover, the nurses can be flexible regarding the format of documentation, while in the electronic recording system they are obliged to follow a specific format to record PU data, although this could be considered one of the advantages of the electronic system, as mentioned earlier.

Evidently, there are many shortcomings of the paper system, which all the TVNs interviewed could comment on. The TVNs who use an electronic system but have used a paper system in the past can now acknowledge the differences; those who use a combination system can comment easily on both systems and can make an immediate comparison; and those who have only the paper system are also in current daily contact with this system so they may encounter more problems than others.

Most TVNs agreed that one of the major disadvantages of the paper system is the difficulty in retrieving the data, which involves many separate problems. One of these is that the files not available all the time and need to be requested, which may take a long time especially when the patient has been discharged. Another problem is that nurses record PU data anywhere in the file, making it difficult to review patients' file. Moreover, it is not only nurses who document on these records but any healthcare professional may do so, which further complicates the reviewing process. Thus, several TVNs have believe strongly that the paper record is a cluster of documents that is

difficult to deal with, and this may not benefit the TVN when reviewing the file or searching for a specific piece of information.

In addition, most TVNs assumed that the information in the paper records would often be incomplete, especially the assessment part of PU data. The nurses are not obliged to document all PU data, and may simply document any data that is convenient to them, even though there are documentation guidelines. This is not the case in the electronic systems which require mandatory completion of all the fields, as previously mentioned by some TVNs.

According to some TVNs, the paper record limits the availability of data, since it is available to be viewed only by one healthcare professional at one time, in one place. Additionally, paper records take a long time to deal with, either in the process of documenting and filling in the long forms, when referring to this documentation, or when collating the data from all the wards and settings. One TVN confirmed that this is a very significant problem for the paper record system as completing these long paper forms could constitute an extra job for nurses who already have a very full schedule and are suffering from staffing shortages.

A further problem is that illegible handwriting is sometimes found in the paper records, making them difficult to decipher and sometimes affecting the process of care.

One TVN from one of the community organisations mentioned that it is very difficult to track and have control over all PU patients in all the settings that belong to this huge organisation. Similarly, it is a complicated and time-consuming process to generate reports by collating all the paper forms which come from all the settings.

However, four out of the sixteen TVNs interviewed expressed their opinion that there was no difference between the two systems at all in terms of the quality and accuracy of data recording. These depended on the reliability of the nurse who enters the data.

Study Two Results (Jordan)

4.18 SAMPLE DESCRIPTION:

The number of patients conforming to the inclusion criteria was 359. This included all the inpatients over 18 years of age in all wards, except low-risk speciality wards such as paediatrics, maternity, day care and emergency. During the survey days, 31 patients refused to participate and their consent was not obtained, and 26 patients were not available at the examination time in their rooms. Both of these groups were excluded from the study, yielding a final sample of 302 patients (Figure 4.11).

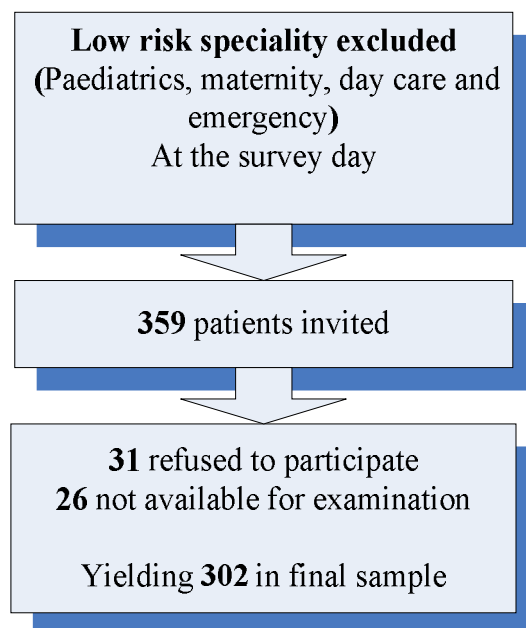


Figure 4.11 The study sample numbers

The two participating hospitals were a university hospital and a general hospital. 57.9% (n=175) of the patients in the sample were nursed within the university hospital and 42.1% (n=127) were nursed in the general hospital (Table 4.9).

Table 4.9 The characteristics of all surveyed patients

Demographical data	Sample (n=302) N (%)
Hospital	
University hospital patients	175 (57.9%)
General hospital patients	127 (42.1%)
Speciality	
Internal medicine wards	121 (40.1%)
Surgery wards	115 (38.1%)
Orthopaedics wards	28 (9.3%)
Critical care units	38 (12.6%)
Gender	
Male	176 (58.3%)
Female	126 (41.7%)
Age	
< 12	0 (0%)
12-18	6 (2%)
19-39	88 (29.1%)
40-59	112 (37.1%)
60-69	64 (21.2%)
70-79	26 (8.6%)
80-89	6 (2%)
> 89	0 (0%)
Length of stay	
0-3 days	153 (50.7%)
4 days – 1 week	57 (18.9%)
1 week- 1 month	66 (21.9%)
1 month- 6 months	23 (7.6%)
> 6 months	3 (0.9%)
Braden score	
At risk (<17)	85 (28.1%)
Not at risk (≥17)	217 (71.9%)
Hospitalisation	
No previous hospitalisation (first admission)	208 (68.9%)
Had previous hospitalisation	94 (31.1%)

For the purpose of simplification and clustering, patients were grouped into four major categories or wards. These are internal medicine, surgery, orthopaedics, and critical care units and wards. The largest group of patients (n=121, 40.1%) were admitted to internal medicine wards and the smallest to the orthopaedics ward (n=28, 9.3%) (Table 4.9).

Of all the participants in the sample, 58.3% (n=176) were male and 41.7% (n=126) were female (Table 4.9), with a mean age of 48.2 (SD 17.0) years. More than half of the patients (54.6%) were aged below 50, and only 10.6% were aged above 70. The median LOS from the admission date until the survey time was 3 (IQR= 8) days. For around 70% of the sample, this admission was their first, before which they were healthy (Table 4.9). In addition, there were no chronic wards in this sample.

4.19 PRESSURE ULCER PREVALENCE

Of the 302 patients assessed in this study, 36 patients (11.9%) had at least one or more ulcers from grade one to four (Table 4.10). Excluding grade one PU, the prevalence rate was 6.6% (n=20). The 36 PU patients experienced a total of 72 ulcers, with 12 of them having a single ulcer and 24 having multiple ulcers. The sacrum (n=11, 30.6%) and the heels (n=9, 25%) constituted more than half of the most frequently affected sites.

The majority (44.4%, n= 16) of PU patients experienced non-blanchable erythema (grade 1) as their most severe ulcer (Table 4.10). The deep ulcer (grade 4) comprised 16.7% (n= 6) of all ulcer cases, and it was noted most frequently over the sacrum (50%).

Table 4.10 The characteristics of PU patients in the sample

PU patients		N=36
Prevalence		
Including grade 1		36 (11.9%)
Excluding grade 1		20 (6.6%)
Prevalence according to hospital		
University hospital		25 (14.3%)
General hospital		11 (8.7%)
Prevalence according to ward		
Internal medicine		11 (9.1%)
Surgery wards		10 (8.7%)
Orthopaedics wards		4 (14.3%)
Critical care units		11 (28.9%)
Location of ulcers		
Sacrum		11 (30.6%)
Heels		9 (25%)
Hips		7 (19.4%)
Ear		1 (2.8%)
Ischium		2 (5.6%)
Elbow		2 (5.6%)
Shoulder		2 (5.6%)
Occipitus		2 (5.6%)
Grade of ulcers		
Grade 1		16 (44.4%)
Grade 2		8 (22.2%)
Grade 3		6 (16.7%)
Grade 4		6 (16.7%)
Location of grade 4 (n=6)		
Sacrum		3 (50%)
Heels		1 (16.7%)
Hips		2 (33.3%)
Others		0 (0%)
Number of ulcers		
Single ulcer (1)		12 (33.3%)
Multiple ulcers (2)		13 (36.1%)
Multiple ulcers (3)		10 (27.8%)
Multiple ulcers (4)		1 (2.8%)
Age of PU patients		
18-50		12 (33.3%)
51-69		12 (33.3%)
> 70		12 (33.3%)
Gender of PU patients		
Male		22 (61.1%)
Female		14 (38.9%)

4.20 THE CHARACTERISTICS OF PU PATIENTS

4.20.1 Hospital:

Even though the PU patients were mainly found in the university hospital, there was no statistically significant difference between the two hospitals and their numbers of PU patients, as evidenced by the Chi-square test results ($X^2=1.71$, $df=1$, $p=0.190$). The prevalence of PU patients was 14.3% in the university hospital and 8.7% in the general hospital.

4.20.2 Speciality:

The highest prevalence of PU patients was found in both the critical care units (28.9%), while the lowest was in the surgical wards (8.7%). There was a significant difference between the prevalence in each of the wards ($X^2=12.7$, $df=3$, $P=0.005$).

4.20.3 Age:

The results showed also that one third (33.3%) of patients with PU were below 50 years of age and that two-thirds (66.6%) of the ulcer patients were aged over 50 years.

4.20.4 Gender:

Although the results show that most of PU patients were males (61.1%, $n=22$), the Chi-square test results show that there was no statistically significant difference between the gender of the patients and the status of having an ulcer or not ($X^2= 0.135$, $df=1$, $p=0.713$).

4.20.5 Length of stay:

The median LOS from admission until survey time for patients without PU was 3 days (IQR= 6), while in the PU group the median was 25 days (IQR= 32). There was a significant difference between the LOS between the two groups as shown by the Mann-Whitney test results ($U=1471$, $p<0.001$).

4.20.6 Location and grade of ulcer:

The findings indicated that most grade one ulcers occurred in the heels (31.3%, n=5), with 25% (n=4) found on hips and 18.8% (n=3) on the sacral area, ischium (12.5%, n=2), occipitus and ear (6.3%, n=1 each). The remaining grades appeared most commonly on the sacrum. With grade 2, 37.5% (n=3) of the cases were noticed over the sacrum area, and the same grade presented on heels (25%, n=2), hips, elbows and shoulders (12.5%, n=1 each). Regarding grade 3 ulcers, they were also seen dominantly on the sacral area (33.3%, n=2), but also appeared on the heels, elbows, shoulders and occipitus (16.7%, n=1). The sacrum area was again the prominent area for grade 4 ulcers (50%, n=3), which also occurred on both hips (33.3%, n=2) and heels (16.7%, n=1). Figure 4.12 summarises all these results.

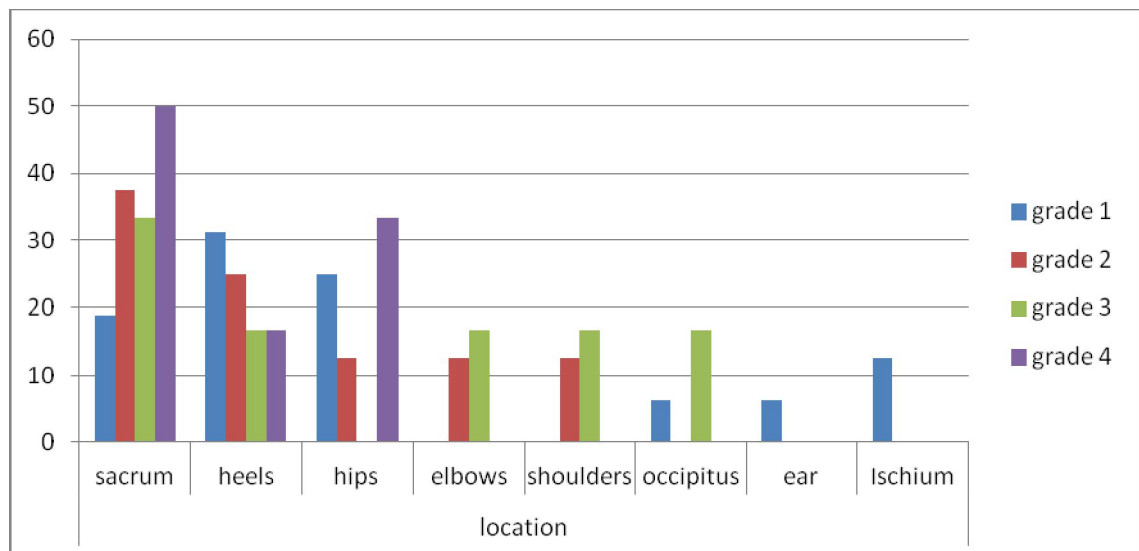


Figure 4.12 Locations and grades of ulcers

4.21 RISK ASSESSMENTS

To ensure comparability with the European study, a cut-off point of 17 was used to determine PU risk, where a patient with a score of below 17 was considered at risk, and

those with scores of 17 or more were considered to have minimal or no risk of developing PU.

The mean Braden score for all surveyed patients was 18.4 (SD= 3.96), and the median score was 20 (Range 7-23, IQR= 6). Based on the Braden scores, 85 (28.1%) patients were considered at risk of developing pressure damage (Table 4.9). All patients who had PU (n= 36) were identified as being at risk according to the Braden scale, having scores of 14 and below.

4.21.1 The continence level

When describing the sample in general, we found that 27.8% of the entire group of surveyed patients were incontinent; 10.9% of these were occasionally incontinent, 13.9% urinary incontinent and 3% doubly incontinent.

In comparing the at risk group and the no risk group by continence level, a significant difference was revealed ($X^2=1.79$, $df=3$, $p<0.001$). Of those who were not at risk, only 6.4% were continent. On the other hand, when the continence level of the PU patients and those who were at risk of developing ulcers was assessed, 82.3% (n=70) were found to be incontinent (Table 4.11).

Table 4.11 Continence level of the study sample

Continence level	No risk, 217 (71.9%) N (%)	At risk or having ulcer, 85 (28.1%) N (%)
Not continent	203 (93.5%)	15 (17.6%)
Occasionally incontinent	9 (4.1%)	24 (28.2%)
Urinary incontinent	5 (2.3%)	37 (43.5%)
Doubly incontinent	0 (0%)	9 (10.6%)

4.22 PRESSURE ULCER PREVENTION

As per EPUAP methodology, the patients were divided into two groups based on their Braden scores to assess the adequacy of prevention care. Group one included patients considered vulnerable to PU formation (total Braden scores <17) or who had a grade one to four PU according to the EPUAP classification system. Group two included those patients not at risk of PU development (Braden scores ≥ 17). Based on this definition, 85 patients (28.1%) were assigned to group one, and were considered to be in need of prevention measures. The remaining 217 (71.9%) were assigned to group two.

The interventions provided to patients were divided into two main types, as per the EPUAP method. The first of these was equipment, which was further divided into three categories: no special equipment, non-powered equipment, or powered equipment. The second intervention was repositioning, which was documented as either not planned/irregular or at frequencies of every 2, 3, or 4 hours.

4.22.1 Mattresses

The findings indicate that most of the patients (88.4%) were placed on standard hospital mattresses. The non-powered equipment category, including, for example, low pressure foam mattresses, was removed from this study because it was not found to be applicable in the surveyed hospitals. The power devices (dynamic air overlay) were provided to only 34.1% of the patients at risk of developing PUs (Table 4.12). The remaining 65.9% received no special equipment. On the other hand, 2.8% of patients assigned to the no risk group were placed over protective mattresses (Table 4.12).

4.22.2 Repositioning

Repositioning, one of the main interventions recorded in this study, was not performed adequately for those patients who were considered at risk of developing PU or even to those who already had an ulcer. More than half (56.5%) of patients at risk, and in need for repositioning, were not regularly repositioned (Table 4.12). Conversely, 3.2% of patients were repositioned in bed even though they were not at risk.

4.22.3 Adequacy of prevention

Patients at risk of developing PU should receive a full range of interventions to prevent ulcer development. PU patients should also receive adequate preventive interventions besides their treatment for two important reasons: to prevent further damage of an ulcer or a more severe grade developing, and to prevent new ulcers from occurring. In this study, where two main interventions were recorded, three preventive care categories could be found. The adequacy of prevention was recorded in line with EPUAP methodology, whereby placing a protective mattress under the patient and repositioning them regularly were considered “adequate preventive measures”, and where only one of these interventions was provided, the expression “some preventive measures” was used. Otherwise, the label “no preventive measures” was used. However, the definition of adequate prevention is also congruent with Bours et al. (2004), where supplying either a dynamic or static supportive mattress, combined with repositioning according to a particular time schedule, were regarded as adequate measures.

The results indicated that only 16.5% of surveyed patients vulnerable to PU received adequate prevention, 44.7% received some preventive measures and 38.8% of the patients received no prevention at all (Table 4.12). Of those patients who received some prevention, 61% received repositioning only and the remainder were given a protective mattress.

Table 4.12 Allocation of PU preventive measures for the sample (n= 302)

Preventive measures	No risk, 217 (71.9%) N (%)	At risk or having ulcer, 85 (28.1%) N (%)
Equipment	217	85
Standard Mattress	211 (97.2%)	56 (65.9%)
Protective Mattress	6 (2.8%)	29 (34.1%)
Repositioning	217	85
Not planned/irregular	210 (96.8%)	48 (56.5%)
Every 2 hours	6 (2.8%)	30 (35.3%)
Every 3 hours	1 (0.4%)	4 (4.7%)
Every 4 hours	0 (0%)	3 (3.5%)
Preventive measures	217	85
No preventive measures	205 (94.5%)	33 (38.8%)
Some preventive measures	11 (5.1%)	38 (44.7%)
Adequate preventive measures	1 (0.4%)	14 (16.5%)

4.23 SUMMARY

Several results were discovered through this research, with each separate part of the study making its own contribution. In Study One, it was clear that the QUAL findings complemented the QUAN findings.

The QUAN findings revealed that primary and secondary care settings were participated in this study. The prevalence rate was significantly different between these settings, and the organisations depended largely on prevalence surveys and PU audits to report these rates. In addition, the PU audits were conducted most commonly on an annual and monthly basis, where the TVN was the clinician responsible for these audits in practice. Moreover, it was noted from the results of this phase that Waterlow and EPUAP were the most common RAS and GS respectively. PU data are recorded on different types of systems, with the complete electronic system being the least commonly used and applied.

It was clear from the QUAL phase results that different types of PU data, such as risk assessment, grading, epidemiology, and prevention data, are collected. These data can be recorded on paper, electronically, or in a mixed format and each recording system has both advantages and disadvantages. The recorded data can be used to report and refer PU cases to the TVN, allowing the latter can generate reports, or follow up some cases according to the organisation's criteria. Different methods of conducting PU audits were identified from the data: actual audits carried out by the TVN or the link nurses; sending out the audit forms and relying on the nurses to fill them in; and reviewing the recording system.

Although there are many uses attached to PU data, several interviewees believed that some PU data is useless, particularly prevalence data. Those interviewees tended to think that incidence data was more reliable data in this regard.

No considerable differences were noticed, from the interviews, between the primary and secondary settings in terms of procedures for recording and utilizing PU data. Two slight differences were discovered, however. Firstly, it is a different person who records

PU data in the two settings: the ward nurses in the secondary settings and the DN in the primary settings, in addition to the nurses in the nursing homes and community hospitals. The second difference is in prevalence calculation methods, since in the secondary settings the prevalence rate is obtained by dividing the number of PU patients over the total number of patients in that setting, while in the community, two methods were reported: either the prevalence is calculated for the DN caseload or for the entire community.

The QUAN results showed a significant difference between the primary and secondary settings in different elements. Firstly, the prevalence rate; the median is higher for the secondary settings. Secondly, the method used to calculate prevalence; the prevalence survey is the common in secondary settings, while different methods used in the primary settings including clinical audits and reviewing paper reports. Thirdly, the frequency of conducting audits; it is conducted annually in secondary setting, while it is conducted annually and monthly in the primary settings. Fourthly, the clinician responsible for PU audits; it is the TVN in the secondary settings, while different personnel responsible for that in the primary settings including the TVN, ward nurses and nurse managers. Fifthly, the type of record; where it is commonly a combination records in the secondary settings, while in primary settings it is combination and paper records. However, no difference noted between the two settings in the most commonly GS and RAS used; EPUAP and Waterlow scale respectively.

The Study Two results demonstrated that the prevalence rate in Jordan was 11.9% (excluding grade 1: 6.6%). The sacrum and grade one were the most common site and grade of ulcers, respectively. The Braden scale showed that 28.1% of the Jordanian sample is at risk of developing PU. Regarding the preventive measures, it was noted that only 16.5% of patients who are in need of attention receive appropriate care.

To conclude, the results of all the studies and phases which comprise the current research are presented in this chapter. The next chapter will be used to discuss these findings in terms of the existing literature.

CHAPTER FIVE:

DISCUSSION

5.1 A QUICK GUIDE TO THE CHAPTER

This chapter is organised into two main sections, discussing separately the findings of the UK and Jordan studies.

This chapter differs from the others in that the findings of the QUAN and QUAL phases of Study One are integrated and discussed together.

In the first section, three main aspects are discussed: the importance of the chosen theoretical framework for the findings, methodological considerations and, finally, the main findings as obtained from both the QUAN and QUAL parts of the study. This includes the discussion of different elements of PU data, such as the recording of data on different systems and the advantages and disadvantages of each one. In addition, the utilisation of PU data is discussed.

Section two discusses the main findings of the Jordan prevalence survey, including the PU prevalence rate, common sites and grades of PU, the impact of certain factors, especially age, on PU development, risk assessment, and preventive measures used in the Jordanian settings.

Study One Discussion (UK)

5.2 DISCUSSION OF THE STUDY FINDINGS IN RELATION TO THE THEORETICAL FRAMEWORK

Nelson's (2002) Data to Wisdom framework was used to guide the current research and was adopted right from the beginning of the study, at the time the research questions were formulated. The framework draws a linear and hierarchical sequence from data, to information, to knowledge, to wisdom, is consistent with our research, since the nurses collect and record PU data, which the TVNs then transform into information by grouping certain facts together. Subsequently, knowledge is reached by synthesis and analysis of the information. Finally, when the TVN has knowledge of PU patients and can apply this knowledge in practice, an evidence based decision will be undertaken, and this is 'the wisdom' according to Nelson framework (2002).

The data is the first and most basic level in the Nelson framework (2002), and can be described as raw facts which are obtained by measurement or observation (Coiera, 2003). The nurses obtain this data either through inspection of the patients' skin or by conducting a thorough risk assessment. For both parts of the current study, the PU data that was collected can be categorized as demographical data, risk assessment data, skin inspection findings, epidemiological data or prevention and treatment data. The application of the selected framework for the study will be demonstrated for each of these areas.

Risk assessment data are a type of data which are collected by nurses and sent to the TVN. If, for example, a patient's Waterlow score is 20, this fact alone as a single datum is meaningless (Georgiou, 2002). With only this datum, the TVN cannot reach the information stage unless the nurses provide other data about the case to the TVN. Other data might be that this patient is immobile and his albumin level is 2.1 g/dl (normal value is 3.5-5g/dl). Combining all this together leads to the information that this patient

could be at risk of PU, based on the TVN's knowledge that a diminished albumin level puts the patient at risk of PU, that a Waterlow score of 20 is considered to indicate a very high risk, and that immobility is also an important risk factor. Thus, the application of knowledge to data leads to information (Coiera, 2003). In this context, the TVN's knowledge of PU risk factors being used along with the data provided, allows an information or inference to be made that this patient is at risk of PU. The application of the TVN's knowledge and understanding that a patient is in need of prevention due to his risk status, in turn leads to wisdom, since the TVN will prescribe equipment or provide a designated care plan for this patient, which will be a wise intervention based on the patient's original data.

Knowing that a patient is at risk without applying this knowledge into practice would mean that the patient may be deprived of preventive intervention, which would lead to deterioration of this case and to him developing an ulcer. In other words, even the patient will be affected if the wisdom is not reached by the TVN or the organisation.

One more implication of this framework regards the epidemiological data. The nurses provide, for example, the total number of PU patients in their wards or settings (e.g. 10) as a piece of data to the TVN but this, as a single number, is meaningless. The total number of patients in their settings or wards (e.g. 100) is also obtained and, again, this piece of data again is meaningless on its own. However, combining both of these facts together will lead to information that the prevalence rate in this given area is 10%. Moreover, depending on the TVN's knowledge and experience of prevalence rates in this area in previous years, a decreasing or increasing trend can be shown. Applying this knowledge of whether the prevalence rate is high or low into practice can lead to wisdom, which enables the TVN to generate a report which provides feedback to the administration level in the organisation and may recommend certain actions, such as purchasing more equipment, or putting on more training for nurses, if the prevalence rate is high.

Grades of PU are another type of data that the nurses collect and record in patients' records. The nurses send the data, for example, that a specific patient has a grade 4 ulcer, to the TVN, which as a single datum is again meaningless. However, combining

this data with other data that nurses may provide, such as about the presence of pus at the ulcer site or whether the patient is suffering from fever, leads to the information that this patient's ulcer is severe and infected. Similarly, this is based on the TVN's knowledge that grade 4 is a deep ulcer, that a high temperature is one manifestation of infection, and that the presence of pus at the wound site indicates the presence of infection. Applying the TVN's knowledge into practice, by prescribing a preventive intervention in line with the severity of the PU grade, like using vacuum therapy or applying certain types of dressing, demonstrates that wisdom has been attained.

As can be noted above, the concepts are closely related and sometimes differentiating between them proves to be complicated (Blum, 1986, Clark, 2004, Gudea, 2005). The highest level on the continuum is the wisdom and the TVN can reach this level when the knowledge is understood, applied and utilised in practice (Nelson, 2002). Importantly, collecting such data without utilising it in practice could lead to deficient care being provided for PU patients at clinical level, and non-evidence based decisions at the management level. There is no point in knowing that a patient is at risk of PU if no intervention is provided, or knowing the patient's grade of PU but not prescribing the appropriate mattress for him, or having a high prevalence and incidence data without this leading to more equipment being purchased by the organisation's management board.

It is clear that a distinction exists between collecting data and utilising it in practice. According to Hollander et al. (2010), the collected data might not meet the actual requests of the organisational employees. This was made clear by two of the interviewed TVNs. One mentioned that nobody had looked at the collected prevalence data for years, which made the data useless, since there is no point in collecting data without utilising the knowledge that it provides. The other TVN claimed that, since it is now the responsibility of care companies rather than the TVN to supply the organisation with preventative equipment, collecting data seems pointless as one of the most important uses of this data, prescribing intervention, is no longer applied.

The other problem which some of the TVNs mentioned is the quality of data collected. To reach a high quality of information, knowledge and wisdom, the basic building

block, the raw data, should also be of high quality. Comber (2003) argues that bad data cannot lead to good decisions, and data whose quality is unmeasured might even be worse than a complete absence of data. TVNs will provide a rapid alternating pressure mattress to a patient with PU grade four, based on the nurses' data that this patient is actually grade four. If the patients' grade is not four, this might mean that the action taken by the TVN would be unreasonable. Another example is that, if inaccurate data about the number of PU cases is provided, this will lead to inaccurate information about the prevalence rate and perhaps to the incorrect knowledge that prevalence is decreasing. Subsequently, this may cause the unwise decision to be taken that there is no need to purchase more equipment or to train nurses on PU thoroughly. By contrast, if accurate data was provided from the beginning, a sensible decision is likely to be made. Furthermore, Georgiou (2002) and Targowski (2005) mention that, in order for the data to be communicated so that it can generate a successful decision, it must be characterized by certain features. That is, it should be valid, reliable, relevant, accurate, meaningful, verifiable, and accessible.

5.3 METHODOLOGICAL CONSIDERATIONS

This section underlines the strengths and weaknesses of the research methodology, and illustrates the importance of the research in contributing to an understanding of how PU data, as a type of patients' clinical data, is recorded and used in practice.

The mixed methods approach used to collect data in this study gives strength to the current work. Although the QUAN phase of Study One provides invaluable information about PU data in general, a lot of detailed information was not clear from the results of the QUAN part alone. The introduction of the QUAL phase helps to provide a more complete picture, and it is believed that such mixing can present a full description of the interest area (Sandelowski, 1995), and allow comprehensive conclusions about recording and using of PU data in clinical settings to be generated.

In addition, the strengths of one single approach can defeat the weakness of the other (Johnson and Onwuegbuzie, 2004). For example, the probing in the interviews was a strength of the QUAL method which could overcome the weakness of the questionnaire responses, which were somewhat limited, by extending them. For instance, the questionnaire highlighted the types of recording employed for PU data, while through the interviews we were able to probe on these different methods more deeply, and illustrate exactly how the data is recorded in each type. Further, the current research was able to explore the experiences of two professionals, the acute and community TVNs, although they were homogenous in their roles and in their recording and utilising of PU data.

To ensure highly reliable and valid data, pilot testing of the questionnaire and the interview schedule was carried out. This was of great help in redesigning and modifying these tools before the actual data collection commenced (Walonick, 2003).

An appropriate statistical test was chosen for the QUAN phase of Study One, and for Study Two, based on the level of the data, and the normality of the distribution (Field, 2009). Despite the fact that the parametric tests are usually more robust (Robson, 1997), the circumstances obliged the use of non-parametric tests, since the data was distinctly non-normally distributed. Nevertheless, the non-parametric tests have the advantage of being simpler to compute, require fewer assumptions, can be used more broadly, and have powerful efficiency (Robson, 1997).

For the QUAL phase of Study One, the template analysis approach was chosen. Such an approach should be followed when there is some prior knowledge about the data being analysed, and this was indeed the case in our data, where the aims of the study and the QUAN phase formulated the prior knowledge and understanding which supported the usage of such an approach for analysis (Crabtree and Miller, 1999, King, 2004). Finally, the results were exposed to verification by the research supervisors.

Although there were many advantages of mixing the two methods, a number of weaknesses existed as well. It was difficult for an individual researcher, as in our case, to accomplish both the QUAN and QUAL research, in terms of data collection, analysis

and interpreting the findings (Johnson and Onwuegbuzie, 2004). The investigator needs to be familiar with multiple methods, understanding the appropriate way to mix them, and needs to follow the correct procedure for each method vigilantly (Johnson and Onwuegbuzie, 2004), all of which places extra demands on the researcher. Moreover, method-mixing is time consuming and costly (Johnson and Onwuegbuzie, 2004). In this study, it took around one year just to collect the data. This long process included identifying the participant sites, where two sites were approached since the first setting failed to provide a good return. A lot of time was taken to find out if the subjects were available within the second site or not, and this step was repeated in the four UK countries. In addition, the ethical approval process was very lengthy, since approval was sought from various bodies: the researcher's university, the NHS, and the ethics committees from the Jordanian settings.

Lack of standardization in the methods used to perform PU prevalence surveys render any comparison between these studies, even within the same country or the same settings, challenging. Therefore, the EPUAP method was adopted, which has been acknowledged and widely used in the literature. It is a robust, valid and reliable method that can be used to compare prevalence estimates in different countries (Gunningberg, 2005, Vanderwee et al., 2007a)

The data collector in Study Two was the researcher himself, who inspected all of the patients, thus strengthening the validity and reliability of the assessments. The researcher is trained in Braden risk assessment and in grading PU according to the EPUAP grading system. Excellent inter-rater reliability and level of agreement was found between the researcher and an expert in the TV field in their grading of some PU photographs. The psychometric properties of the Braden scale have been broadly tested (Defloor and Grypdonck, 2005, Pancorbo-Hidalgo et al., 2006, Kottner and Dassen, 2008b), and the EPUAP grading system has been tested for inter-rater reliability and has a Cohen kappa >0.80 (Defloor and Schoonhoven, 2004), which is an excellent agreement. The Jordanian settings were chosen to ensure accurate representation of the Jordanian population, with the criteria set at a minimum of 200 beds per hospital, to ensure a good sample size.

5.4 DISCUSSION OF THE MAIN FINDINGS

5.4.1 Clinical Data

In any discipline, generation of knowledge requires information. The building blocks of information are raw data, as the study framework demonstrated (Nelson, 2002). PU data is our research area in this project, and the goal is to gain a full clinical picture of PU data in the organisation systems, in terms of how it is collected, recorded and used. Therefore, both phases of Study One were conducted for this purpose. The QUAN phase of the study was designed in a manner which would allow it to determine different elements of PU data, which is together constitute information about PU. On the other hand, the QUAL phase of the study explored how PU data are recorded and used in clinical settings. The information obtained from the two phases of the study shape our knowledge and understanding of the topic investigated, and this is linked clearly to the study framework, where the TVN can reach the knowledge from these data as well, and then use it in practice, thus reaching the wisdom.

The data was collected from different settings across the UK, including acute care settings and community settings. In other words, the data covered all areas of clinical practice, and thus it can provide a comprehensive and holistic view. Bethell (2002) points out that all acute and community settings in the UK collect data on PU, but there is no agreement on precisely what should be collected and how. Therefore, the current study chose to explore this issue in depth. The following subsections discuss PU data, as inferred from the results.

5.4.1.1 Prevalence Data

Prevalence data is one type of PU data which was collected from the different settings. The prevalence rate was calculated here by staff reporting, whereas in Jordan the researcher personally inspected patients' skin. In the UK, since the TVNs are the only clinicians who can deliver this information, the questionnaire was directed at them. The nurses in the field could have ward or individual unit data, but since we were interested in the problem as a whole, such responses were deleted. The TVN should have high

quality data, since their offices represent a central point to which all nurses in the organisation report.

However, collecting prevalence figures in this way could be criticized, since no direct inspection of the patients was carried out by the researcher, who relied solely on the questionnaires as completed by the TVNs. This method could mean that some underreported cases were excluded from the calculation, but the primary aim of the study was to explore how PU data is recorded and used, and prevalence is one type of data that is recorded and used in these settings. The prevalence rate as a figure in the UK was merely a secondary aim here.

The QUAN results prove that there is a significant difference in the prevalence rate between the primary and secondary settings, and that the median of the prevalence rate is higher in the acute hospitals as well. This fact coincides with the work of Maylor and Torrance (1999b) who found that prevalence was higher in a hospital than in a community setting. In fact, it can be said that because patients in the hospitals are acutely ill, set to have major operations, or frequently immobile, they are at higher risk of PU development (Gunningberg, 2004).

The prevalence rate in the acute care settings ranged from 3.5%-23%, with a median of 8%. The review by Kaltenthaler et al. (2001) reported prevalence ranges for UK hospitals of 5-32.1%. Over six years (1992-1998) the prevalence in acute hospitals ranged from 10-18.6%, becoming 6-10% for the same period if grade one was excluded (O'Dea, 1999). In another study conducted over 5 years (1992-1996), prevalence ranged between 8.5% and 14.7% (Torrance and Maylor, 1999). A study that was conducted in five European countries revealed a prevalence of 21.9% in the UK acute settings (Vanderwee et al., 2007a). Therefore, huge variation in reported prevalence rates has been seen.

The primary settings, as shown by the QUAN phase of the study, consist of several sub-setting, such as nursing homes, community hospitals and community caseloads. The QUAN findings revealed that the prevalence in the nursing homes ranged from 1% to 11.1%, with a median of 4.3%. In Kaltenthaler et al.'s review (2001), the prevalence in

nursing homes ranged from 4.6-7.5%. In two further studies prevalence rates of 7.9% (Shiels and Roe, 1999), and 7.4% (Levett and Smith, 2000) have been reported.

With regard to the community caseloads, huge differences were also noted in the QUAN results and rates reported in the literature. This could be because, as the QUAL part of the study explained, it is difficult to calculate prevalence rates in the community, and different ways of calculating the rate have been documented. Specifically, the difference is in the denominator of the prevalence formula, as some TVNs explained. If prevalence in the entire community is wanted, the number of PU patients registered in the DN's records is divided over the total population. In this case the denominator could reach half a million or more, yielding a low rate. On the contrary, if prevalence in the DN caseloads is required, the number of PUs seen by the DN will be divided over the total number of patients registered in the DN's caseload and, using this denominator, a larger and more reasonable rate will be obtained. In the current study, the rate ranged from 0.5% to 25%, with a median of 3.7%. Kaltenthaler et al. (2001) disclosed a prevalence ranging from 4.4-6.8%. A large GP database survey of people aged 65 or over (n=1 million) found an annual prevalence ranging from 0.31-0.7% (Margolis et al., 2002). The prevalence study conducted by Torrance and Maylor (1999) in an integrated trust with acute and community services over five years (1992-1996), found a prevalence range of between 3% and 6.1% in community settings, which included DN caseloads and patient homes. Again, there is much variation amongst prevalence rates reported in the literature.

Moreover, the QUAN results revealed that primary settings in general and the community caseload particularly, made up the majority of settings which do not conduct audits. The QUAL results linked this fact to the difficulty of calculating prevalence rate in the community, and, in fact, this is an example of how the integration of both parts of the study was able to clarify any incomplete picture coming from one part alone.

The median of the prevalence rate in the nursing homes was higher than that in the community caseloads. This could be due to the admission criteria for nursing home residents, as it is likely that they are more impaired and dependent than the elderly living in the community (Keelaghan et al., 2008). In addition, they are prone to many

PU risk factors, such as immobility and incontinence, increasing their prevalence compared to those residing in their own homes (Keelaghan et al., 2008).

The community hospitals care for older people, so the relatively high prevalence rate found reflects the rates in the elderly care settings (Torrance and Maylor, 1999). In this setting, the prevalence rate ranged from 5% to 15.6%, with a median of 7.4%. A survey undertaken using the EPUAP methodology to measure PU prevalence in Welsh orthopaedic units and community hospitals, where data was collected from 1196 patients from both settings (51.4%, n=615 were from the community hospitals), found that PU prevalence was 26.7% in the community hospitals (James et al., 2010).

As is clear, it is not feasible to compare the current results with those of the studies mentioned above, due to many methodological differences in calculating the prevalence rates. These could be, for example, different methods of conducting these audits, the use of different assessment tools, different patient groups, and whether grade one cases are included or excluded (Defloor et al., 2002, Stephens and Bick, 2002). However, the rates presented give an impression about the size of the problem in the UK, which appears close to our own impression.

An integration of QUAN and QUAL findings has been used in this study to allow us to gain a complete picture about PU audits in clinical practice. The QUAN phase showed the types of audits available for PU, but was unable to give any insight on how these audits are conducted in practice. The prevalence data provided in the previous section was based mainly on a systematic method of data collection, either prevalence surveys or clinical audits, as reported by the TVN in the questionnaire. Besides this, however, some sub-settings in the primary sector depend largely on reviewing their paper reports to formulate this data. These settings where a less structured way of undertaking audits was used were nursing homes and community hospitals. It is generally acknowledged that conducting a prevalence survey or undertaking a clinical audit can lead to better and more accurate data than reviewing paper reports retrospectively.

The QUAL phase provided a clear picture about how these audits are conducted in clinical practice. According to the Healthcare Commission (2005) in the UK, 70% of

NHS organisations gather PU prevalence data but the collection methods differ widely. The QUAL results in this regard were consistent with Fletcher (2001) who pointed out that there are numerous methods of conducting PU audits. The first method is relying on all personnel to report PU occurrence to a central point. The interviewees affirmed that this method was followed in many settings, where the TVN sends the audit forms to the nurses to fill in and send back for the TVN to collate and use to prepare a summary report. However, Benbow (2004) suggested that the audit forms which are sent from the nurses back to the TV department are sometimes incomplete or include inaccurate data. Fletcher (2001) explained that the audit can also be performed by relying on a small group of trained personnel to gather data. This is congruent with the findings, in cases where the TVN sends the forms to link nurses, who collect data and examine the patients, before sending them back to TVN.

The third way which Fletcher (2001) outlined is when a single researcher is responsible for assessing the patients and gathering the data. Some interviewees reported that the TVN inspects every patient in the wards and calculates prevalence and incidence rates in this manner. This approach may be difficult to follow in the community settings, which have many sub-sites associated with them, and is probably more suitable in the acute settings. The method was also the one followed in the prevalence survey in Jordan. The fourth method, according to Fletcher (2001), is retrospectively reviewing the records without inspecting the patients. This is used when the TVNs review their systems (either electronic or paper) and make reports about the PU audits. However, such an approach could lead to the prevalence and incidence rate being underestimated since a considerable amount of PU data are never recorded in the files by nurses (Whittington and Briones, 2004)

As was clear from the QUAN results, the TVN is most commonly the clinician responsible for PU care and data. This is consistent with their job description, since the TVN is said to be responsible for all aspects of wound care, and PU is one type of wound (Lowson, 2004). Moreover, it is the responsibility of the TVN to undertake regular PU audits, and to monitor the incidence, prevalence, prevention, and treatment of PU in different care settings (Lowson, 2004).

In some small units, such as nursing homes and community hospitals, the QUAN results were able to establish that TVNs are not employed. This could be related to financial concerns or because these small settings do not generally need TV support and, if the need emerges, they simply ask for TV help from elsewhere. Alternatively, it may be because these settings are usually connected to a local PCT, and all the referrals and reports are sent to the TV department within it. Again the QUAL phase of the study clarified some vagueness in this regard, since it was discovered that, even though the person responsible for PU data in the primary settings may be a TVN, this TVN absorbs his data from the nurses in the nursing homes and community hospitals or, in the case of community caseloads, from the DN. The DNs provide their services for PU patients, in addition to many others, either in surgeries or in patients' homes. For example, they can perform blood glucose tests, help give injected medicines and change dressings (NHS, 2010).

Edwards (2010) affirms that all types of wound care are central to DN practice in community sites in the UK. This finding was based on an audit undertaken to measure the number of patients with wounds in DN caseloads. The audit forms were completed by the DNs for every patient with a wound on their caseloads over a specific week. In total, 381 patients with 645 wounds were identified and, of these wounds, 20% were PUs. What is more, the patients with wounds constituted 15% of the DN caseloads, and consumed about 53.1% of the DNs time, which was around one and a half hours for every patient in the week. Our QUAL results are supported by these findings, as they concluded that it is the DN who is responsible for gathering PU data in the community and who, in turn, reports all data to the central TV department in the relevant PCT.

5.4.1.2 Risk assessment and ulcer grading data

The second type of data collected and recorded by the nurses is risk assessment and ulcer grading data. The QUAN results showed that Waterlow is the most common RAS in the UK and this result is supported by many authors (Waterlow, 1991, Cook et al., 1999, O'Dea, 1999, Papanikolaou et al., 2002).

Some of the TVNs stated in the interviews that the aim of their organisation is to perform the risk assessment as early as within the first six hours of admission. However, Ayello and Braden (2002) believe that assessment intervals should be based on the patient's acuity. In the acute care settings, the first risk assessment should therefore be performed at admission and then repeated every 48 hours or whenever the patient's status changes. In long-term care, the risk assessment should be undertaken on initial contact then reviewed every week for the first 4 weeks. After that, it is recommended that they are performed monthly to quarterly, and when the patient's status changes. In home care, finally, they should be conducted on admission, and then with every subsequent visit.

As suggested by many nurses and as per the NICE guidelines, the recording of PU assessment should be supported with photographs and/or tracings calibrated with a ruler (NICE, 2005). These actions must be performed monthly as a minimum, or with any change to the patient's condition, according to one organisation's policy (Harris, 2009). The photograph is regarded as a type of PU data that can be communicated by the clinicians.

Regarding ulcer grading data, the EPUAP appears to be the most common GS used in the UK, in line with Wilson (2010) and the NICE (2005) recommendations. Although most of the sample confirmed that they use a GS, a small proportion do not and may instead depend on clinical judgment, or in some cases the nurses did not know whether their organisations use a GS or not. This is consistent with Moore and Price's (2004) findings, where 70% of the nurses confirmed that there was a PU classification scale in use in their organisation, but 78% of those were unable to name the classification tool correctly.

5.4.2 Recording of PU data

The integration of both phases of the study was also important in this section. The QUAN phase showed that the most common way of recording of PU data is the combination method. It was possible to form a general impression of what was meant by this term but, for a more specific explanation, the QUAL phase of the study was

necessary. In other words, the QUAN phase gave a general idea about the type of records which were available to record PU data, but did not give any details about how PU data were recorded on these records, and this what the QUAL phase aimed to gather.

No difference was found between primary and secondary settings in terms of the way in which PU data is recorded, except with regard to the clinician who records it, as mentioned before. All types of PU data already discussed can be recorded on paper, electronically or with combination records in all settings. Discussion of the system of recording applies equally to reporting or referring, because the nurses use either a paper or electronic system to record, report and refer PU patients, and the TVN receives the forms either in a paper or electronic format. It was judged that there was no real third format available, only a combination of the two other formats. This approach is supported by Hippisley-Cox et al. (2003) whose study only compared paper and electronic records, despite combination records also existing.

Recording of PU data may also serve as a means of reporting and referring, especially if the system is electronic. The nurses often record PU data on the electronic system as routine record keeping. The TVN, as a member of the healthcare staff, can then access this data and, in this way, the recorded data is used as a reporting method. That is to say, the nurses who record the data state, in accordance with specific criteria, that they need the TVN's help, or the TVN classifies a case which they view on the system as a referral in line with the TV's department criteria. Therefore, the recorded data can also be used to refer case to the TVN without the need to fill in any additional forms.

The system does not work in quite the same way when paper records are used, however. Here the nurses record PU data on the conventional paper chart system that is used to record all other clinical data for each patient. According to organisational policy, the nurse should report cases to the TVN by filling in a specific paper form and sending it to the TV office. If organisational policy dictates that a case should be referred for TVN help, this will be done either by completing a separate referral form or by specifying which cases need the TVN's help on the reporting forms. Alternatively, when the TVN receives the reporting form, the decision may be taken to follow certain cases, in line

with specific criteria. Again, in both cases, the TVN will transform the PU data received from the nurses into information and then to knowledge, and the knowledge obtained will be applied in practice to produce an organisation's report in the case of reporting, and to prescribe preventive equipment in referral cases, meaning that the wisdom is reached from both activities.

Whichever system is used, the TVN will learn that there is a patient with PU, but the difference is that, in electronic cases, the nurse will know as soon as the form is sent, and this can be said to add credit to that system. In contrast, on paper, the TVN will not become aware of cases which may warrant their attention until the field nurses fill in a reporting form and send it to the TVN (via various means of communication). Takeda et al. (2003) claim that paper incident reports consume a lot of time and health care resources in the process of communicating, storing, and responding to relevant data. Despite the advantages of the electronic system of reporting, the paper method is still the dominant one (42.1%, n=69). This could be related to the fact the adoption of electronic systems in PU patient care is still in its infancy as the QUAN results showed (9.8%, n=16).

In addition to the above two systems of recording, reporting and referring of PU data, the QUAL phases findings suggested that a third one, the clinical incident reporting system, can be added to the list. This system is an electronic system used to report and refer data but is not considered part of routine clinical recording of PU data, unlike the first two systems which are used to record, report and refer PU data. These systems are discussed below.

5.4.2.1 Paper recording, reporting and referring:

In settings which use paper systems, all PU data are recorded using this system and, if a case needs to be reported or referred, a paper form is filled out for this purpose and sent to the TVN. This is in agreement with the Audit Commission (2009), who recommend that every setting should be issued with PU incidence recording forms to be filled in weekly, monthly or at any nominated interval. The data about PU patients and the

details of their ulcers should be recorded on these forms. Then, the nurses who are in charge send the forms back to a central point (TVN).

The problem with this system as a means of reporting, however, is that there is a chance that a patient who is admitted with or develops PU could be discharged within a short period and, therefore, may not be included. Thus, it is more appropriate to report the moment the ulcer is noticed, either when the patients are admitted with an ulcer or as soon as they develop one, as this might lead to more accurate data. However, in order to accomplish that, an extra effort is required from the nurses, unless a computerised system is used (Audit commission, 2009).

The findings of QUAL phase of the current study showed that there were two separate aspects of this recording system which need to be discussed: Firstly, the physical features of the paper system as a medium and, secondly, the content and structure of the information that is recorded on it. There are advantages and disadvantages of the paper system in both of these areas.

a) Physical aspects of paper records:

The physical aspects of paper records could represent both advantages and disadvantages for this system according to the QUAL phase findings. On the one hand, a paper system means that the records are transferable (Fitzpatrick, 2000), since it works in the majority of locations, whereas an electronic system requires a power supply, and a network connection (Coiera, 2003). Nevertheless, these issues are now more easily overcome by the application of a wireless network connection which permits staff to use the system via portable computers inside the organisation or from long distances (Coiera, 2003). Another advantage that the TVNs brought up is the system's ease and familiarity of use. The nurses are accustomed to using the pen and paper method to document data, and require no special training (Tange, 1995). The QUAL phase showed that this is especially true for the nurses from the middle age group, who are particularly familiar with such a system, and were possibly educated on documenting in this way.

On the other hand, the physical properties of paper recording systems mean that their availability is limited (Tang and McDonald, 2001). Many TVNs said that paper records are not available all the time and need to be ordered and requested, especially if they are archived away when patients are discharged. Moreover, it may take an unacceptable amount of time for records to be ordered and delivered (Tange, 1995, Roukema et al., 2006). Luo (2006) disclosed findings similar to those of the current phase of the study, and pointed out that these records are only available to a single user in a single place at any specified time. Hence, if the record is sent with a patient who is to undergo a diagnostic procedure, other parties will lose access (Englebardt and Nelson, 2002). Also, patients' physical records are not moved between their healthcare providers, which could lead to an incomplete impression of a patient's medical history being formed, fragmented care and potential replication of some diagnostic tests, if the results have not been shared (Anderson et al., 2006).

According to Berk et al. (2008), paper records are unavailable in 10% of emergency circumstances and their observation was backed up by Wood and Aceves (2005), who found paper documentation not to exist for 30% of the time in physician-patient interactions. This may interrupt the patient care.

Most importantly of all, storing of paper is difficult and costly and requires a lot of space (Coiera, 2003, Luo, 2006). Since paper records usually become more and more cumbersome with time, it becomes very difficult to gain a quick overview of the contents (Roukema et al., 2006). In addition, paper is delicate and vulnerable to damage (Coiera, 2003) and loss (Anderson et al., 2006).

b) Informational aspects of paper records:

The structure of the data in paper records may also have both advantages and disadvantages. On the one hand, a paper method may allow the nurses to be more flexible since they can record free text, without any coding or being constrained to one format or structure (Tange, 1995). This possibility was ascertained by the study findings, since many TVNs listed it as an advantage of the paper system. However, at the same time, the approach has drawbacks, as many TVNs stated that the retrieval

process is difficult. This conforms with Tange (1995) and Anderson et al.'s (2006) findings, since they conceded that searching and retrieving data from a single paper record or across several records, would be difficult and may entail a significant demand on human resources (Coiera, 2003). This is because the data is entered as free text, unlike in electronic records, where the fact that it is entered as structured coded data makes retrieval and searching much easier.

In the same way, clinicians may be unable to find a particular piece of data they require from PPR. To illustrate this point, Tang et al. (1994) studied 168 outpatient consultations, and found that the data required was searched for, but not established, in 81% of cases.

Some TVNs pointed out that the difficulty of retrieving data from paper records means that this activity will be time-consuming, and that it will be difficult to extract data about patients to track the assessment and prevention they receive in clinical settings. This idea is supported by Coiera (2003) and Harding (2009) who also recognized that data extraction from a group of records stored amongst a huge number of records, could be time consuming and difficult (Harding, 2009) and recommended that an indexing scheme should be available prior to data searching (Coiera, 2003).

Many TVNs believed that PPRs often contain illegible data. By the same token, many researchers have concluded that paper documentation and recording of patient information is deficient in quality, accuracy, illegibility, and error susceptible, which, in some cases, may cause lethal medical errors (Tange, 1995, Varon and Marik, 2002, Munyisia et al., 2011). It could be difficult on some occasions for anyone other than the writer of a piece of information to understand what is written, so illegible handwriting can influence the quality of data and, in turn, the quality of care (Tange, 1995, Tang and McDonald, 2001, Englehardt and Nelson, 2002, Coiera, 2003, Luo, 2006, Roukema et al., 2006). According to Tange (1995) the reason for this could be the lack of structured and standardized data entries, which lead to the omission of some data (Tange, 1995). It seems that employing EPR could minimize these errors by eliminating unreadable handwriting from patient records (Thompson and Brailer, 2004).

Many TVNs cited the incompleteness as one of the major drawbacks for the paper recording of PU data. This was consistent with Roukema et al. (2006) and Harding (2009), who found that paper based data are unclear and incomplete, and that this could disrupt the quality and continuity of care. The incapability of PPR to capture multimedia information, like audio and video data, is another form of incompleteness (Salmons, 2000). In TV area, Newton et al. (2000) indicated that the use of video technology and the organisation's intranet permits digital photographs and videos to be sent to medical professionals, like TVNs, and other related consultants so that quick and proper intervention can be obtained, since medical instructions can be accessed and requested from distance. This can no doubt improve the quality of care provided to patients but, clearly, is not possible with the use of PPR.

5.4.2.2 Electronic recording, reporting and referring

According to the Audit Commission (2009), electronic means are possibly the most perfect mode of recording. However, currently only certain organisations employ such recording systems. The regular recording practice is designed in a manner that means the data necessary for prevalence and incidence estimation can be accessed centrally (Audit commission, 2009), so that, with this approach, PU patients can be easily monitored without further reporting actions by the staff.

Regarding the availability of such systems to record PU data, the QUAN part of the study showed this to be quite limited. A complete electronic recording system for PU was used in less than 10% of the sample. In some cases, some kind of combination of electronic and paper systems was used, but such a combination does not guarantee that the data will be reported electronically. In the literature, there is no clear information on how widespread the adoption of electronic systems for recording PU data has been. Most of the studies which have been conducted highlight only the electronic recording of general patient data in the healthcare organisations.

Moreover, different terms have been assigned to EPR in the UK. Jones (2004) claims that the first scheme to introduce automated medical records at national level was the Hospital Information Support Systems (HISS) in 1988. Since then, various terms have

been used, for example, the Electronic Patient Record Programme, and Integrated Care Records.

The use of electronic medical records in general practice in the UK is noticeably high, with a study showing that 97% of the 8,810 practices in England employ a system which contains some sort of electronic documentation by GPs (Jha et al., 2008). Another survey conducted across the whole of the UK, found that 89% of GPs have adopted EPR (Schoen et al., 2006). The GPs can use these systems to review laboratory test results and document patient notes. The high rate of adoption in the primary settings was related to two factors in particular according to Benson (2002). Namely, these were governmental grants to computerize the general practice, and the introduction of promotional free computer schemes by two GP suppliers (VAMP and AAH Meditel).

Although there is wide use of EPR in the primary settings in the UK, the use in the secondary settings is limited. According to a survey carried out in 2004, only 7.7% of UK hospitals use a system with full electronic clinical results, and 2.6% have an electronic prescribing feature (Bywater, 2005 cited in Jha et al., 2008, p.850). As explained by secondary settings pioneers, the reason for this is the high cost and limited benefit of these systems (Benson, 2002). This theory is supported by Robertson et al. (2010), who demonstrated that implementation of EPR in the secondary settings has been slower than was originally predicted. It was envisioned that every NHS patient in England would have an individual EPR by the year 2010 but Nicholson (2010) noted that it has gone beyond two years of the date laid out in original agenda for introducing the EPRs, and still no confirmed date has been set for their implementation. It has been admitted that the delay was due to the need to develop and implement the required infrastructure.

It was clear from the QUAL phase of the study that there are many advantages and disadvantages for using an electronic system in clinical practice. These can either relate to physical and informational factors.

a) Physical aspects of electronic records

The QUAL results demonstrated a general agreement that in line with Luo (2006), where the use of an electronic system means that data will be available at all times and accessible from any place, in this regard, by simply entering an NHS number on the screen. In addition, Coiera (2003) confirmed that data can be readily reproduced for sharing purposes and to create backups for safekeeping, preventing data from being lost or damaged in the event of natural disasters, including hurricanes, fires, flooding, tornadoes or earthquakes. Although paper records can also be duplicated, the process of scanning and reproducing is less time and labour efficient. In addition, a huge amount of space is required for storage, and paper records are more susceptible to loss and damage (Luo, 2006).

Some TVNs claimed that electronic data recording can be painfully slow for nurses lacking previous mouse and keyboard experience. This view is supported by Feldon (2002) who pointed out that electronic recording systems are complicated at the beginning of the service, while paper record systems are simpler to introduce to new employees. Paper systems also may be readily customized for particular needs, while electronic systems usually need reprogramming. Furthermore, no specific format is required for any new data which has to be entered onto the paper record. On the computer, however, data is recorded in a prearranged format, which restricts the record, especially if new categories and terms emerge because, in these cases, full reprogramming would be required (Chamorro, 2001).

b) Informational aspects of electronic records

According to some TVNs, the electronic reporting and referring of cases to them is one of the most important advantages of electronic systems, as it makes the process easier, more accurate and less time consuming. When EPR are applied, patient information is available at the organisations' fingertips. One TVN from the community settings said that she benefits from the complete electronic system used in her organisation because it enables her to track cases. This is especially important since the community organisations are responsible for many different settings, and it would be difficult to

learn about the cases in the all of these if there was no central system connecting all the individual settings together. Using the electronic method, PU cases that require TVN help are automatically referred via the system. There is no separate referring form or policy; the TVN routinely follows up the more complicated grade 3 and 4 cases which are found on the system after the nurses working in the settings simply record data about all PU patients onto it. This valuable information can be easily reported when the needs emerge. Subsequently, the process of care delivery can be evaluated and the output of clinical practice can easily be reviewed in this way as well (Coiera, 2003, Deese and Stein, 2004).

Report generating is another advantage which was clear from the results. If data is readily available, then generating reports can also be easily achieved. A report for a large set of data relating to a huge number of patients within the system can be generated by giving appropriate commands and clicking on the mouse. Conversely, in the case of paper records, it would be very difficult to collate all the data necessary for this, especially in huge organisations, or in community organisations where several settings may belong to the same larger organisation. This finding is in line with Harding (2009) who reported that extraction of PU data from EPR is usually easier than from PPR. Coiera (2003) and Ambinder (2005) verified that the capability of an electronic database to search based on different keywords eases the retrospective audit of data and creation of reports. This is therefore helpful for producing PU prevalence and incidence reports.

Some interviewees believed that employing a computerized system can improve the quality of care. If the nurses record PU cases immediately on the system and, by simply clicking the mouse, reporting and referring take places, the TVN then learns about the ulcers in real time and, because intervention can be decided on very quickly, might be able to prevent further damage being caused. This point is reflected in Miller and Sim (2004) and Ambinder (2005) who found that employing EPR improves the quality of care by preventing dangerous medicine interactions and unsuitable examinations or management, and decreasing medical errors by the use of alerts and reminders. In the example of PU, employing such a system could have great effects on the quality of care

patients receive, especially if these systems generate clinical reminders for the nurses or TVNs to provide dressings, assess the risk level or position patients. In addition, the electronic prescription system can accurately determine the appropriate antibiotic (for instance, penicillin) to be given to an infected PU patient, taking into consideration the allergy history of this patient to the particular medicine.

The implementation of EPRs could reduce the fragmentation of patient care and maintain its continuity, which will, in turn, improve the quality of care (DePhillips, 2007). These systems combine all duties and departments, such as the pharmacy, laboratory tests, medication administration, documentation, and other secondary systems, together (Doyle, 2006). Thus they permit access to full patient records, and not only one section of information, ensuring that comprehensive care is provided holistically and not for each separate event in time (Deese and Stein, 2004).

This also highlights another advantage of the electronic system which came out of the QUAL results: the easy tracking of patients. Since the system allows all data to be readily available, and it is not fragmented on different paper records, this means that the patient and information on, for example, the origin of the ulcer, assessment and care provided, can be easily tracked (Audit Commission, 2009).

The interviewees raised two main issues related to time consumption when dealing with the EPR. Most TVNs agreed that the presence of an electronic system to record, report and refer patients in clinical practice could save staff time, since all of these actions can be done electronically, instead of collating paper forms that may come from ten or twenty sites, for example. This is much more practical because, in some situations, there is only one TVN in the whole organisation, making it tremendously difficult to review all paper records for all the patients. It is clearly much easier and saves time to just shift between the patients by clicking the mouse. Ambinder (2005) argues that EPR is an easier and quicker method of recording the data, searching for specific sections of data, and retrieving the data. The other side of this argument, which was expressed by other TVNs interviewed is that employing an electronic system will consume a lot of the nurses' and TVNs' time since more training is needed in order to expand the skills required to perform all the duties electronically. This explains why some organisations

use a combination of two systems for a period of time before a full transition to the complete electronic system is made, as it allows nurses to have more practice with the new electronic system. As Luo (2006) points out, it could be true that computerized systems are time-consuming in the early stages of adoption, but later they might become less so. This is clear as many interviewees explained that a lot of nurses are from the middle age group and tend to resist technology.

In general healthcare practice, Deese and Stein (2004) point out that EPR allows nurses to minimize the time spent on administrative duties, eliminates the need to search for misplaced or lost PPRs, and browse a huge number of pages to find data. Consequently, more time will be freed up for nurses to spend with the patients.

A study was performed to evaluate the impact of EPR on documentation time and found that the use of bedside and central workstation desktops save 24.5% and 23.5% respectively of nurses' time used on documentation throughout a shift (Poissant et al., 2005). Similarly, in contrasting between paper and electronic documentation, Stengel et al. (2004) demonstrated that the time needed for electronic documentation was significantly less than for documentation on paper ($p < 0.0001$). However, in another study the opposite happened. Following the application of an EPR system, the time the nurses spent on nursing care documentation increased by 3.6%, which fifteen minutes per shift (Saarinen and Aho, 2005).

Even though it was beyond the scope of the research to collect data about the quality and accuracy of PU data in both recording systems, the interviewees did comment on these aspects as features of PU data recording systems. Surprisingly, four out of the sixteen TVNs interviewed expressed the opinion that there was no difference between the PPR and EPR at all in these terms, and data quality depends, instead, on the reliability of the nurses and their willingness to record and report correctly and on time. This is in line with Coiera (2003), who illustrated that the quality of records is based principally on the quality of data recorded on it, or on the approach of data recording, but not on the record itself. In other words, the paper record is not poor merely because it is written on paper (Coiera, 2003). If there are any inconsistencies, missing information or delays in recording the data, the quality of this data will be affected.

Some TVNs stated that electronic records may be easier, less time consuming and more complete, but not necessarily accurate. The accuracy issue, as already mentioned, depends largely on the nurse who enters the data. If the person grades PU wrongly, he will enter the wrong data and the question of whether he is using a paper or electronic system will make no difference at all. In other words, an electronic system will not establish if the data is accurate or not or, to put it more simply, nurses who record inaccurate PU data on paper records will give the same data to the TVNs who use electronic systems. The TVN will enter the data as it comes.

However, many of the TVNs interviewed confirmed that the completeness of the data on an EPR is one of the major benefits of this system. This could be due to the structured data entry nature of these systems, as opposed to free text entry, which promotes completeness, enhances searching and retrieval and therefore improves the quality of data available for decision support (Tang and McDonald, 2001, Roukema et al., 2006). All of this could be very useful in the field of PU. Gunningberg et al. (2008) recommend the adoption of EPR and ready templates to standardize the documentation of PU data, which is could promote and accelerate the recording of this data.

This was further supported by Gouveia-Oliveira et al.'s (1991) study which compared the quality of data recording and reporting between an electronic system that had fully structured data recording and a paper system that involved conventional free text recording, for endoscopy reports generated by the two systems over one year. The results revealed that the menu-driven data recording systems had superior results over the free text systems, which may have been due to the reminders and alerts feature on the electronic systems. The structured reports had 18% of data missing compared to 48% for paper reports. In the same way, Harding (2009) showed that presence of electronic systems in the PU field could guarantee fewer incomplete records than paper systems.

Furthermore, due to the structured format of the EPR, it could be used as an educational tool, as many TVNs pointed out, especially when the electronic system includes mandatory fields in the record. This will guide the nurses and educate them on how to systematically document PU data. For example, the nurse should enter the grade of

ulcer, then move on to the location, then the size and so on. This idea is supported by Tang and McDonald (2001) who point out that an interactive electronic system obliges the user to record more data. By means of this feature, the systems store data, improve completeness, and can also be used for educational purposes (Tang and McDonald, 2001).

On the other hand, many people also cite disadvantages for such systems in clinical practice. The occurrence of technological problems is one of the most important of these. Many TVNs expressed their fears that the system may crash and that loss of data might be possible, and this affected their willingness to engage with electronic systems. Indeed, technological errors could lead to loss or improper disclosure of patient data (Luo, 2006). If an EPR system stops working, there may be considerable down time without data, depending on how effective the organisation's backup strategies are. Conversely, in a PPR system, loss is likely to affect just one patient record, in comparison to the threat of losing numerous records in the event of an EPR system crash (Tange, 1995, Tang and McDonald, 2001, Luo, 2006).

Some interviewees mentioned that implementing an electronic system of recording is very expensive but, actually, the cost of implementing any electronic system could represent advantages and disadvantages at the same time. Some view huge costs as obstacle for adoption (Tang and McDonald, 2001, Luo, 2006). For example, Valdes et al. (2004) asserts that there are more than 264 different EPR software programmes, but 61% of organisations claim that cost is the major reason for not acquiring them.

In accordance with Wang et al. (2003), two cost categories are linked to the application of EPRs: system costs and induced costs. System costs include the cost of the hardware, software, implementation, training, and continuing maintenance and support. Induced costs are the costs of the conversion from a paper to electronic system; for instance, the temporary reduction in the organisation's output following the application stage.

Although the implementation of such systems is expensive, it is not usually long before the profits surpass the costs for a number of reasons. Employing EPRs increases the availability of patient data, which shape comprehensive view (Ambinder, 2005). This,

in turn, makes the care providers aware of earlier tests which were carried out, and they can contact the caregiver who requested those tests for further discussion and clarification (Novak, 2005), thus minimizing duplicated and redundant testing. Deese and Stein (2004) mention that another way of decreasing the cost is by confirming the accuracy of billing and diminishing payment delays. What is more, the EPRs reduce medical errors (Anderson, 2004, Miller and Sim, 2004), which, in turn, could reduce the overall cost of healthcare services.

According to Hillestad (2005), a complete EPR system could save \$81 billion of U.S. healthcare costs every year by enhancing the quality of healthcare. The same benefit is applicable in the case of PU. Defloor et al. (2002) point out, for example, that prevalence and incidence monitoring costs could be reduced if patient records are held electronically and include suitable fields for PU data recording.

The QUAL findings demonstrate that staff can sometimes resist technology. However, Kirkley and Stein (2004) explain that nurses do not oppose the technology itself, but they are against any additional workload, when they already have little free time available. The nurses also fear that the technology will replace them completely (Simpson, 2004). As Lee (2005) argues, nurses' critical thinking ability will be lost when ready-made electronic care plans are used. However, according to Chandra and Paul (2004), nurses should be aware that the nature of providing care will not change from the current style by the introduction of EPRs and, rather, the application of technology will certainly alleviate some of the frustrations and redundancies in clinical nursing.

Rogers (1995) claimed that, in the diffusion of innovation model, even when a new idea has an apparent benefit, it is often difficult to adopt. He observed that it could take several years from the time that innovations first become available until it they are broadly adopted.

Timmons (2003) conducted a study on 31 nurses from three UK NHS hospitals, to explore the reasons for resistance to the application and use of computer systems in their work. It was found that opposition to technology implementation in some cases is

completely irrational and can only be explained as ‘technophobia’. Other reasons are related to the time these systems consume, the absence of adequate terminals, which can be put down to fiscal constrictions, and finally they believed that, since it is easier to write and print on computers, they would be expected to produce a huge volume of documentation.

The confidentiality and security of the record was another problem highlighted by one TVN. Medical records include a range of sensitive data (e.g. on sexual behaviour, psychiatric history, HIV tests and substance abuse) (Dimond, 2005). This is also particularly important in PU cases, since sometimes the records could be embarrassing for patients if they contain ulcer photographs, and access to them by certain people would be considered a breach of the patient’s privacy. Dimond (2005) argues that it is crucial that patients trust the security of these records. If that not the case, patients will not disclose sensitive information to caregivers, which in turn will mean they may fail to obtain proper care.

Naturally, only authorized clinicians are supposed to have access to patient data (Van Ginneken, 2002, Dimond, 2005). It can be claimed that EPR are better protected than paper records, particularly in the event of theft, fire, and natural disasters. In addition, the safety of electronic data is further assured by the fact that data is encrypted, and hardware safekeeping keys and passwords are required (Endsley et al., 2006). Moreover, it is easy to track the access to patient records, and monitor any unsuitable actions (Van Ginneken, 2002, Luo, 2006), whereas in the case of paper records, a white coat is usually sufficient to enable someone to walk inside a hospital and abscond with numerous PPRs (Van Ginneken, 2002). However, if security is compromised in electronic systems, huge amounts of data can be released inappropriately.

5.4.2.3 Incident reporting system

Organisations should have active and reactive risk reporting systems in place, and suitable actions should be taken when problems emerge (Kiernan, 1997). The development of PU is an unwanted clinical outcome and has been identified by several

organisations as an undesirable incident that should form part of all incident reporting systems (Kiernan, 1997). However, from the QUAL phase results, it was clear that these systems are only used to report PU cases to TVNs, but not for record keeping purposes.

In fact, the QUAL findings revealed that reporting PU cases to the TVN is a very important step that nurses anywhere should take. There are many reasons for this. The information will be collated in the TV department, analysis will take place, and then the findings will be reported annually or at a regular basis to the management level. The data can then be used to allocate equipment to PU patients.

According to the TVNs interviewed, most paper and electronic reporting is done by filling in paper or electronic forms and sending them to the TVN, so the latter can collate these forms and generate a report. Reporting using a system which is specific for reporting works differently, however, in this case, PU data is recorded on either a paper or electronic record, but the reporting will be done on a specific electronic incident reporting system, such as PRISM, Datix or Safecode, used by the organisation to record adverse events. (Audit Commission, 2009).

The Datix system was the most commonly reported system used for this purpose according to the QUAL findings. The manufacturer describes it as software which can be employed for risk management, patient safety, incident and adverse event reporting (Datix, 2008). Over three quarters of NHS institutions in the UK use this programme. Basically, it is a database system which is available on the organisation's intranet and can be used to report any incident (Datix, 2008).

Using Datix, nurses can report PU by writing the case details directly onto the system. According to Audit Commission (2009), the form should be filled as soon as the PU is first noted. This gives this system an advantage over paper reporting, since, with the latter, the forms are sent at specific intervals, but not as soon as the case is noticed. After that, the TVN receives an automatic email from the system regarding the incident details, and can log onto the website to complete the investigation and carry out incident analyses by generating statistical and graphical format reports.

In addition, the TVN can inform the link nurses about appropriate prevention and treatment. For example, they may advise on the correct dressings, types of mattress, or any other specific interventions through this system. By enabling the appropriate intervention to be offered within days instead of weeks, this will improve patient care (Datix, 2008). Furthermore, it has been argued that completing an online form as an alternative to a paper form has prompted the clinicians to report more incidents (Datix, 2008).

Despite the above benefits, some TVNs who use this system complain that it is a general adverse incident reporting system used to report any clinical incidence and, therefore, it is difficult to deal with because it is complicated and not specifically tailored to PU cases. However, the Audit Commission (2009) suggested that the incident form could be modified and still be used to record PU data. Thus, in spite of the problems mentioned, nurses still use Datix to report PU cases.

Takeda et al. (2003) evaluated the impact of an electronic online system for incident reporting on quality management in hospitals. Their findings indicated that such systems have been efficient in increasing the number of reports, avoiding adverse medical events, and reducing the report completion time. Filling in a report on this system takes around nine minutes, while it generally takes around half an hour using paper based reports, so the use of electronic methods could save more than 30 hours every month. Moreover, it can proof and correct errors through the direct monitoring and decision making that is based on this system.

Most of the interviewees proved that reporting is carried out in line with national guidelines which recommend that all grade two and above PUs are reported as clinical incidents (NICE, 2005, RCN, 2005). Some commentators have recommended classifying grade one PU as an alarm signal, and not as a case of PU itself (Defloor, 2007 cited in Saleh, 2007, p.33), or grading the damage only when a skin break exists, and not for discoloration of intact skin (Fletcher, 2001). Despite this, some interviewees explained that their organisations still report all cases, including grade one.

Two main problems of reporting exist, according to the field notes of some interviews. The first problem is that reporting PU cases is not done in real time. Most of the cases are not reported at the time of occurrence, especially in the case of early ulcers, i.e. grade one. This could delay the start of the necessary preventive programme and subsequently lead to the deterioration of the ulcer. Returning to the study framework, the Nelson (2002) continuum cannot be followed effectively in this case, since a delay of sending PU data to the TVN will lead to a delay in transforming this data to information and then to knowledge. If the TVN learns about a PU case in the late stages, the fact that the wisdom has not been reached earlier will delay the issuing of preventive equipment.

The second problem is the underreporting of PU cases. Reviewing the literature reveals many reasons for the underreporting PU data (Bergquist and Frantz, 2001). Firstly, the PUs that are newly developed may not be reported, since nurses may not carry out regular skin assessments. Secondly, the appearance of PUs is commonly regarded as an indicator of poor nursing care, which negatively impacts on the nurses' willingness to report PUs which develop. Fear of personal accusation and monetary fines from the healthcare facility could be possible justifications (Harding, 2009). Inaccurate PU risk assessment could be a third cause of underreporting PUs, when the nurses do not recognize which patients are at risk. Fourthly, the inability to differentiate a grade one ulcer (non-blanchable erythema) from a blanchable erythema may lead to an underestimation of the occurrence of PU (Paquay et al., 2008).

Indeed, the development of PU does not always prompt nurses to record or document its occurrence, perhaps because they do not view it as a significant problem. Benbow (2004) conducted an audit to compare her assessment of 211 PU patients over a two week period with the nurses' assessment. She found that a significant number of patients at high risk of developing PU were not reported by the staff as at risk ($n=86$, 57%, $p<0.0001$). Moreover, sixteen PU patients were not reported by the staff at all.

As a consequence of underreporting and neglecting such cases, deterioration of ulcers to more advanced grades will occur. Thus, some organisations take grade 3 and 4 seriously, and a safe guarding procedure has been instigated in line with the

safeguarding adults policy to explore if these cases have developed as a result of neglect or not. An annual TV report from one healthcare organisation (Harris, 2009), indicating any grade 3 or 4 PU that has been noted by members of the health or social care team, is produced at the demand of other organisations like the local authority, who seek clinical advice. Three factors will be investigated: whether actions have not been employed to prevent PU (based on local and national protocols), whether a patient is susceptible (ill, elderly, dependent on staff to take care of him and protect him against injuries), and whether there is proof of neglect (intentional or unintentional withholding of suitable and sufficient intervention, such as inadequate provision of suitable devices, nutritional evaluations and repositioning schedules). If the response to any of these three questions is affirmative, the safeguarding adults procedures will be initiated and a strategy meeting and discussion will be organized.

Underreporting of PU cases to TVNs means that some data will be missing. If there is no data, this will lead to interruption of the Nelson (2002) continuum at an early stage, since there will be no transformation to information and knowledge, which means that the TVN will be unaware of PU cases in the organisation and, in turn, this will deprive the patient of the wise decisions on appropriate intervention that the TVN could take based on available knowledge.

5.4.3 Utilisation of clinical data

The data collected by any system should be useful; otherwise there would be no point in just collecting data per se. Therefore, the central benefit of clinical data is to fulfil the needs of the care workers and the service users (Lelliott, 2003). The nurses and TVNs need to use this data in their practice, and the PU patients also need to benefit from the data that the clinicians collect from them, through improvements in the quality of health care they receive.

This section of the chapter represents the pinnacle in the theoretical framework, where the wisdom can be reached using the knowledge that is based on patient data (Nelson, 2002). The TVN is the knowledge worker who employs his experience to organise,

interpret and understand the data in order to prompt decisions that are evidence based. The TVN connects the data with domain knowledge, and conveys the knowledge to the level of care, where it is mixed with wisdom to present safe care (Schleyer and Beaudry, 2009).

The wisdom can be employed at different levels in the current study, such as the clinical and the administrative level. When epidemiological data about PU, such as prevalence or incidence data, is collected, this will lead to the utilisation of the knowledge based on this data in practice. For example, the ward nurses may receive appropriate preventive equipment based on the data they provide to the TVN, and the administrative level of the organisation may decide to employ more nurses in a specific ward based on the knowledge that the incidence rate in this ward shows high trends. There would be no point in just having all this data, information, and knowledge, without benefiting from it by applying it to achieve patient or organisational goals and objectives.

The majority of the TVNs from both settings judged the collected PU data as useful. However some interviewees thought some elements of PU data, such as prevalence data, may be useless. This was clear from the QUAN phase results, as some TVNs from primary and secondary settings reported that they do not record PU prevalence data, and did not have such data to release. The subsequent QUAL stage was required to explain and expand this issue. Four TVNs (two from each setting) out of the sixteen interviewed has discontinued collecting prevalence data, since they believed that incidence data provides a more reliable, powerful and relevant insight. Moreover, they claimed that it is difficult to collect prevalence data in the community settings.

The QUAL branch of this study showed that PU data can be used to generate a report or conduct an audit. The TVN collates all the PU data sent by the nurses or it is collected retrospectively by reviewing the recording system over a predetermined interval to generate a report or create an audit. These audits and regular monitoring of the PU problem, and especially the prevalence and the incidence data, can be used to evaluate the trends of the problem and then organise care to be provided to patients. Elkin et al. (2010) claim that clinical patient data can be used to produce alerts for clinicians that might assist in ensuring that all suitable care services are offered for patients.

Performing clinical audits is the most common and important use of patient data at different levels (Lelliott, 2003). First, at the level of individuals, if each nurse in each ward records and reports PU cases to the TVN, this enables conducting of PU audits at the level of each individual ward. However, for this data to be useful and meaningful, it should be recorded during routine clinical practice in a standardised way (Lelliott, 2003). This process could be used as a means of training the nurses in carrying out the audits, filling in the forms, learning how to grade PU and using the RASs.

Secondly, the TVN collates all of the data together and produces a report at the organisational level. According to Rose (2000) the incidents are evaluated locally and the information obtained from these adverse events is discussed with those who are in direct contact with the patients, so that key lessons can be learnt, which could lead to improvements in services and care. The third level is the national or regional level. If the organisations at the preceding level report PU cases to a national reporting point, such as the National Patient Safety Agency (NPSA) this leads to a national clinical audit level (Lelliott, 2003). The main role of the NPSA is to enhance patient safety by planning, applying, and monitoring the adverse events reporting system (Milligan and Dennis, 2004).

The presence of electronic data makes it easier to collate the data or retrospectively generate a report. This view is consistent with Elkin et al. (2010), who confirmed that computable data can be reviewed retrospectively more quickly and with minimal effort, thus facilitating the conducting of audits, such as prevalence or incidence audits.

The data that comes from the clinical audit can be used as a type of feedback which, as the QUAL phase showed, can be used at different levels. The patients, nurses, TVNs, and the management in the organisation could all benefit from this data and decisions may be based on the feedback it provides. Harker (2000) believes that healthcare workers spend a lot of time gathering data on PU prevalence and incidence, which is commonly employed to induce purchasing decisions. In PPR, even if the process is well-organized, it takes a lot of time to review large volumes of patient records, and the time-saving element is therefore a key benefit of indexed EPRs (Grant et al., 2006).

Thus, reviewing electronic records and drawing feedback, and later decisions, from them would be much easier.

Prevalence and incidence data, which are among the most important types of data that can be inferred about PU, are types of clinical data that can be utilised in clinical practice. It is well known from the literature that there are many uses of this epidemiological data. For example, it can be used to evaluate the effectiveness of prevention programmes to reduce hospital acquired PU (Gallagher, 1997, Whittington et al., 2000), to assist in planning and resource provision (Baharestani et al., 2009), to decide whether the prevention strategies offered are sufficient or not (Gallagher, 1997), as a quality monitor (Baharestani et al., 2009) and to ensure that best care is provided (Defloor et al., 2002, Harding, 2009).

Clinical data that is recorded on PU patient records can also be used to report or refer PU cases to the TVN, as mentioned earlier. Therefore, clinical data plays a major role in these activities, and it would be impossible to report or refer a case without it. This belief is consistent with Elkin et al. (2010) who state that clinical patient data can be utilised to refer a patient to a specialist. Again, such a referral could not happen without this information. Reporting and referring could also lead to safeguarding procedures and investigation taking place in some situations, as discussed previously.

However, there are many barriers to clinical data usage, such as incomplete data recording, storing the free text data in PPRs, the time needed to enter structured data on the EPRs, and error rates linked to data extraction (Elkin et al., 2010). These barriers make clinical data usage limited. This was clear in our results, as some TVNs have stopped collecting prevalence data as a kind of clinical data because of inaccurate recording of PU data. One TVN pointed out that nurses may under or over grade PUs and another stated the problem of underreporting prevents him from accurately calculating the prevalence rate because, when there is underreporting this means incomplete data will make the prevalence lower than it should be in reality.

In fact, several factors play a role in determining the usability of data. First of these is the data quality in the systems, which is a critical feature in deciding how useful and

efficient the data may be (Horsfield, 2002). The completeness of clinical data is another essential factor, since it decides the extent to which information gathered from the data can be used for numerous purposes (Lelliott, 2003). One more factor is the ease of use of the systems. Lelliott (2003) believes that data quality should be based on the level to which a clinician finds the systems (paper or electronic) easy to use in clinical practice.

However, the presence of free text data in PPRs makes searching and retrieving data a more painful process, if an impossible one in some situations, and leads to underuse of the clinical data. Moreover, according to Elkin et al. (2010) the necessity to code the clinical data in a form which is compatible with the EPRs could present an obstacle to using this clinical data. This is doubtless to be the case at the early stages of employing an electronic system but, later, when the coding system is available, this barrier could be removed. The existence of errors as a consequence of data being extracted from records makes the data useless, but this could be a problem of the system that holds the data and not of the data itself. Data may be both accurate and useful, but if it exists in a system which is difficult to extract from, this represents an obstacle for appropriate data use. An example of this is the paper record, where the manual extraction of data could be susceptible to errors, whereas a structured electronic system would involve fewer errors.

Study Two Discussion (Jordan)

5.5 PREVALENCE

The PU prevalence rate obtained in Jordan is extremely useful in giving a broad picture of PU in Jordan and it establishes a baseline measurement for future reference. As a prevalence study, it can be used to increase awareness, develop PU policy, and arrange resource allocation, with the eventual aim of enhancing patient care and reducing adverse complications (Gallagher et al., 2008). In line with Gunningberg (2006), it is believed that understanding PU prevalence rates is an essential preliminary action in the arranging and application of efficient prevention plans.

The current study was a methodological replication of the EPUAP study (Vanderwee et al., 2007a). The validity of a comparison between different studies is improved when they have similar populations, data collection methods and procedures, ulcer classification and risk assessment approaches, and prevention practices (Fletcher, 2001, Defloor et al., 2002, Baharestani et al., 2009, Harding, 2009). In Jordan, a prevalence of 11.9 per cent (grade one excluded: 6.6%) among hospitalized patients was found to be lower than the prevalence rate reported in Europe. The EPUAP study found a prevalence of 18.1% (grade one excluded: 10.5%) in five European countries (Vanderwee et al., 2007a).

The EPUAP methodology has also been used to conduct prevalence studies in other developed countries, and these also reported higher prevalence rates than Jordan. In Sweden, Gunningberg (2006) found the prevalence rate in two separate years was much higher than in Jordan. In 2002, it was 33.3% (grade one excluded: 10.9%) and in 2004 a rate of 28.2% (grade one excluded: 14.1%) was obtained. The same author conducted a study in three different settings, and found a prevalence of 23% in a university hospital, 13.2% in a general hospital and 20% in a nursing home (Gunningberg, 2004), which, again, are all higher than the Jordanian rate. In the same country, Wann-Hansson et al.

(2008), found a prevalence of 27% in acute care hospitals, which are similar to the hospitals in which the current study took place. In Ireland, a prevalence of 18.5% has been reported (Gallagher et al., 2008). Tannen et al. (2004) estimated a prevalence of 33% in the Netherlands and 28% in Germany.

To sum up, it has been noted that prevalence rates in several developed countries, who conduct prevalence studies using the same standardized method, are higher than that in Jordan. The possible reasons for this are given in the next sub-section.

5.5.1 Reasons for the low prevalence rate in Jordan

Two key explanations for the relatively low prevalence rate found in Jordan may be offered. The first one is the age of the Jordanian sample, which was younger than many samples. The second could be related to patients' frailty, since the Jordanian participants were, again, healthier and less frail than patients included in many other samples.

The Jordanian sample is somewhat younger than other samples which have been studied. Many authors have found that age had a significant impact on PU occurrence and that increased age is associated with PU (Bergstrom et al., 1996, Perneger and Heliot, 1998, Whittington et al., 2000, Williams et al., 2000, Gunningberg et al., 2001b, Anthony et al., 2003, Bours et al., 2003, Marrie et al., 2003, Gunningberg, 2004, Tannen et al., 2004, Fisher et al., 2004, Baumgarten et al., 2006, Schoonhoven et al., 2006, Fogerty et al., 2008, Nonnemacher et al., 2009). The reason for this, according to Mitchell (2004), is that the subcutaneous fat layer that protects bony prominences is lost as people become elderly. In other words, the skin becomes stiffer and less resistant to pressure with increased age, due to a reduced elasticity and capability to stretch. In addition, there is a deceleration of the tissue repair mechanism. Also, Dini et al. (2006) demonstrated that chronic diseases which the geriatric population may suffer from often lead to lengthy immobilization and poor nutrition and these are potential factors for PU development.

In Jordan, the findings showed that the sample was skewed towards lower ages, as most participants were young. The mean age was 48.2 (SD 17.0) years, and only 10.6% (n=32) were aged over 70. In the five European countries, on the other hand, Vanderwee et al. (2007a) found that around half of the patients (49.1%, n=2921) were aged over 70. No patient in the Jordanian sample was over 89 and, for the 80-89 age group, in comparison with the other countries in the EPUAP study (lowest Portugal 11%, highest Sweden 26%) Jordan had the lowest percentage (2%).

In the Sweden samples, Gunningberg (2006) found a mean age of 71.5 (SD 16.6, range 18-101) years, and in the Irish population the median age was 69 years (Gallagher et al., 2008). Additionally, in Tannen and co-investigators' (2004) study of both Dutch and German populations, the mean age was between 63 and 66 years respectively. In the same regard, Wann-Hansson et al. (2008) reported a mean age of 71.2 (SD= 16.4) years and, in Gunningberg's (2004) study of different settings, she declared that 50.5% of the patients in the university hospital and 71.1% in the general hospital, were above 70 years old. Clearly, the age of Jordanian patients is lower than the age of the samples in the comparable studies.

In reality, this difference in age could relate to the demographical characteristics of the Jordanian people in general, since around one third (31.3%) of the population are below fifteen years old, 64.5% are 15-64 years old and merely 4.2% are aged 65 and above. The average life expectancy of people in Jordan is 78.9 years (U.S. Department of State, 2007).

Notably, the age of PU patients in the current study was high, with two-thirds (66.6%) of ulcer patients being aged over 50 years. There was a significant difference between the PU patients and patients free from ulcers in terms of age. The mean age of PU patients was 57.3 (SD 16.92) years, while the mean age of the patients who were free from ulcers was 46.9 (SD 16.69) years. There is around ten years difference between the mean of the two groups and this difference was statistically significant, as evidenced by the Mann-Whitney test results ($U=2998.5$, $p<0.001$). This finding may support the claim that the age is one of the possible risk factors for PU.

The second factor that might partly explain the relatively low PU prevalence rate in Jordan is that around 70% of the sample was healthy before the current admission, which was also their first. In the same way as before, a significant difference was noted between the patients with and without PU in terms of their hospitalization history (continuity correction=10.12, df=1, p=0.001), with more PU patients having had previous hospitalization than those who were free from ulcers. However, Zhao et al. (2010) also obtained a low prevalence rate (1.8%) in a cross sectional study, and linked this to patient acuity and LOS.

In fact, the hospitalization and co-morbidities of patients are considered extremely important factors which favour the formation of PU. Baumgarten et al. (2006), in a multivariable analysis, suggested that recent hospitalization or even residency in a nursing home before hospital admission have a role in PU development. Another study proved that most hospitalized patients have chronic degenerative diseases, such as malignancy, pneumonia, diabetes mellitus, heart failure, cerebral vascular accident, sepsis, fever, renal failure, hypotension, and anaemia, which make them susceptible to PU (Lyder, 2006).

Numerous other studies have recognized medical co-morbidities as risk factors for PU development. In Lindgren et al.'s (2004) prospective study, which included 530 patients from surgical and medical departments, it was verified that patients who developed PUs had had significantly longer hospital stays and had more heart disease, fractures, and lower diastolic blood pressure than non PU patients. Similarly, patients who have had surgical operations, who require intensive care, and those who have arterial obstructive disease of abdominal and pelvic arteries and malignant tumours, are at higher risk of PUs (Nonnemacher et al., 2009). Furthermore, Frankel et al. (2007) indicated that the existence of renal impairment, represented by high creatinine/ blood urea nitrogen, raises the risk of PU 3 fold and being paraplegic, 17 fold.

In conclusion, all of these diseases or disorders can play a role in PU development. They can interfere with the normal physiological processes in the body, either through the effect of pressure on tissue or through decrease blood supply at the cellular level. The Jordanian sample included few patients suffering from these diseases and the

findings indicated that most of the Jordanian patients were young, had acute illnesses and were previously healthy, which may have made the presence of ulcers among them limited.

Although the prevalence figure obtained in this study is lower than many other numbers published, it still comprises a problem for the healthcare system in Jordan. Jordan is a developing country with very limited resources which need to be preserved. The presence of grade four ulcers (16.7%), which necessitate the development of appropriate prevention guidelines, needs to be taken into account, especially since there are no clear prevention guidelines in effect in Jordan. This issue should be addressed urgently by the healthcare system leaders in Jordan, especially in the acute care settings.

5.6 CHARACTERISTICS OF PU PATIENTS

5.6.1 Hospital

The two hospitals that participated in this study were a university hospital and a general hospital, with more participants in the university one since the capacity of this hospital, in terms of the number of beds, is much higher. Even though the number of PU patients in these two hospitals was not statistically different, the prevalence of PU in the university hospital was higher than in the general hospital, at 14.3% and 8.7% (including grade one) respectively. This is in line with Gunningberg (2004) who found a higher prevalence rate in the university hospital compared to the general hospital, with results of 23% and 13.2% respectively. This could be related to the type of patients in each hospital. Although there were no significant differences between the two hospitals in terms of patients' previous hospitalization ($X^2=0.018$, $df=1$, $p=0.894$), the number of patients who had had previous hospitalization was higher in the university hospital than the general hospital (58.5%, $n=55$ vs. 41.5%, $n=39$ respectively). This may mean that the patients in the general hospital were less frail than those in the university hospital.

Moreover, the median LOS from admission until the survey took place was longer in the university hospital (mean=6, IQR=15 days) than in the general hospital (mean=3, IQR=4 days). This means that patients in the general hospital were newer to the hospital, which might indicate that those patients were acute and less complicated cases.

In addition to this, the university hospital in the present study tends to be used as a referral facility, providing for all subspecialties. All hospitals in the north of Jordan, including the general hospital in this study, transfer complicated cases to the university hospital, where advanced health care facilities are available. This means that the complicated cases do not stay for long in the general hospital but are sent to the university hospital where they stay longer. This fact could ultimately decrease the prevalence of PU in the general hospital and increase it in the university hospital.

5.6.2 Speciality

The results show that there was a difference in prevalence rates between different specialties. This is difficult to compare with other studies, however, due to differences in the specialties. The patient groups for each specialty are different from hospital to hospital and from country to country, and this renders the comparison impossible. For instance, if we compare the current study with the EPUAP study (Vanderwee et al., 2007a), the Jordan sample had the lowest (0%) level of chronic care (values ranging from Italy 2% to Portugal 39%) but critical care here was the highest (13%) compared to a range of 2% (UK) to 9% (Belgium). The highest prevalence rate found in our study was in both the critical care units and the internal medicine wards. The EPUAP study found that most of the surveyed patients were admitted to acute/ high dependency care wards (62.3%, n=3703) (Vanderwee et al., 2007a).

5.6.3 Gender

In line with a lot of previous research, the findings of this study revealed that there was no statistically significant association between the gender of the patients and if they have PU or not. In one large study, Anthony et al. (2003) confirmed that gender was not found to be a significant predictor of PUs, after looking at a sample of 43,735 records.

This view is also supported by Bergstrom et al.'s (1996), Papanikolaou et al.'s (2002) and Frankel et al.'s (2007) findings.

5.6.4 Length of stay

It was found that there was a significant difference in the LOS from admission until the survey time between the patients who had PU and those who were free from ulcers. This result is supported by many authors who found that PU patients had longer lengths of stay (Williams et al., 2000, Anthony et al., 2004, Stausberg et al., 2005, Gallagher et al., 2008, Nonnemacher et al., 2009).

5.6.5 Grade

The study showed that nearly half (44.4%, n=16) of PU cases were grade one, which is also consistent with other research. The EPUAP study found that 42.1% (n=454) of ulcers were grade one, except in Portugal, where grade three ulcers were most common (Vanderwee et al., 2007a). Similarly, Gallagher et al. (2008) found that almost 50% of PU cases were grade one, Wann-Hansson et al. (2008) found 50.7% at the grade one and Gunningberg (2004) revealed that 60-66% of ulcers inspected in her study were also of the lowest grade.

5.6.6 Location

Most ulcers were located in the sacral area, which is in harmony with the EPUAP study, where the five countries reported the sacrum as the most commonly affected site. Moreover, in the current study and in the five countries in the EPUAP study, the sacrum and the heel were the two most common ulcer sites (Vanderwee et al., 2007a). Many other studies have also recognized the sacrum as the most common site of ulceration (Gunningberg, 2004, Gallagher et al., 2008, Wann-Hansson et al., 2008). What is more, it seems that the most severe ulcers usually appear in this area, since this was found to be the case in all the European countries of the EPUAP study, except Sweden and the UK (where the most severe ulcers were noted on the heels) (Vanderwee et al., 2007a) as well as in the current study.

5.7 RISK ASSESSMENT

To ensure comparability with the EPUAP study (Vanderwee et al., 2007a), the Braden scale and the item incontinence of the Norton scale were used in this study to assess the risk of patients developing PU.

Despite the youthful nature of the Jordanian sample, Jordan was roughly in the middle (28% at risk – i.e. Braden score <17), placed between Belgium (35%) and Italy (23%) (Vanderwee et al., 2007a), when its at risk patients were compared with patients in the EPUAP study. The figure obtained was within the same range as other studies. In Wann-Hansson et al.'s (2008) study 24.1% (n=126) of patients were at risk (Braden score <17) and Gunningberg (2004) demonstrated that the proportion of patients at risk (Braden score <17) was 23% in the university hospital and 30.5% in the general hospital she studied.

However, a comparison of risk assessments carried out in these different studies is not useful, even if the same scale is used because the cut-off points used to define risk status are different (Baharestani et al., 2009). In the current study complying with the EPUAP methodology was assured, where a Braden risk score of <17 is used as the cut-off point to define whether a patient is at risk (Vanderwee et al., 2007a), while, in other studies, a different cut-off point was used. In Tannen et al. (2004), for example, a score of 20 was used to identify at-risk patients.

The mean of Braden scale scores in the current study was 18.4 (SD= 3.96), which is very close to those found by Gunningberg (2004), where a mean of 18.9 (SD=3.5) in the university hospital, and 18.4 (SD= 3.8) in the general hospital were reported. The same author found a mean Braden score of 18.5 (SD=3.5) in another study (Gunningberg, 2006).

The incontinence findings were also compared with the golden standard, and it was found that urinary incontinence was much higher in Jordan (14%) than in Sweden (5%), which had the highest European figure, but lower (3%) in double incontinence than any

of the European countries except Italy, for which the same figure was reported (the mean European figure was 9.2%).

5.8 PREVENTION

Phillips and Clark (2010) believe that prevalence studies per se are pointless if they do not explore preventive measures. Therefore, in this study, two main interventions were recorded: equipment and repositioning, as per EPUAP methodology (Vanderwee et al., 2007a), and because these were the most common types of intervention used in Jordan. It was noted that there were some other interventions, such as skin inspection, moisture creams or ointments, protective cushions, and nutritional therapy, but their use was limited.

Moreover, all of the intervention data recorded for this study was for patients in beds, as no intervention was used for patients seated in chairs. The reason behind this was that most of the PU patients were bedridden and could not be placed in a chair and, even if they were seated, no prevention was provided while they were in the chair, since they would only have been placed there for a short time. Thus, the focus was on the prevention provided on beds. Many studies have shown that prevention to relieve pressure is used less frequently whilst patients are sitting compared to when they are in bed (Gunningberg, 2005, Wann-Hansson et al., 2008). Gunningberg (2004) found that preventive measures were rarely provided to patients on chairs in hospital care.

The suitability of preventive interventions was assessed in Jordan. Unfortunately, the use of intervention measures for patients who need them is limited.

- **Equipment**

Jordan had the lowest number of patients receiving protective a mattress compared with the European figures from the EPUAP study. They were placed under only around one third (34.1%) of the patients who were in need of them in the current study. In Portugal this figure was 37%, in Sweden 49%, in Belgium 73%, and in the UK 95%. Only Italy's

results were lower than Jordan in this regard, as only around one quarter of at-risk Italian patients receive equipment (25.1%) (Vanderwee et al., 2007a).

- **Positioning**

Less than half (43.5%) of the same patients were scheduled for repositioning at regular intervals. This finding is within the range of the EPUAP study, where the lowest figure was in Portugal (16.1%) and the highest in Italy (51.4%) (Vanderwee et al., 2007a).

However, this finding is not surprising as many developed countries experience a limited provision of preventative care for patients at risk of PU formation (Perneger and Heliot, 1998, Bours et al., 2001, Bours et al., 2002, Gunningberg, 2004, Gunningberg, 2005, Lahmann et al., 2005, Vanderwee et al., 2007a, Tannen et al., 2008, Rich et al., 2009).

5.8.1 Reasons for inadequate prevention

Rationalization for inadequate prevention can be divided into two main reasons. The first is the limited availability of preventive equipment. Informal discussion with some of the head nurses in Jordan revealed that a lack of equipment is the major reason for the insufficient provision of preventative care. Jordan, as a developing country, places all patients on standard mattresses and at-risk patients are placed on a dynamic air overlay, which is an alternating pressure overlay system with pump. They do not employ non-powered devices, like the low pressure mattresses or foam mattresses. Moreover, there are no pressure redistributing mattresses, profiling beds, heel and elbow protectors allocated in the research hospitals. This could be related to the financial situation of the hospitals that the study took place in specifically and the situation in Jordan in general and is supported by the fact that more patients in need of prevention receive repositioning than equipment (61% vs. 39%).

Clearly, regular repositioning can usually be performed without any special equipment or devices, and depends simply on the nurses to organise. However, the nurses repositioned only 43.5% of patients at risk, which demonstrates that the lack of equipment alone is not the problem.

In fact, there were some patients who were not at risk of PU development and who received some sort of prevention for no obvious reason (6%, n=13) and this fact leads to the second rationalisation for the low percentage of PU prevention in Jordan, which is that there is a knowledge deficit amongst the Jordanian nurses regarding PU prevention and assessment. The nurses might not view PU as a prioritized nursing problem or perhaps they do not recognize which patients are at risk in order to provide preventive interventions. Only one of the surveyed hospitals uses a validated risk assessment tool (Braden), and the other relies on nurses' clinical judgment. Moreover, through a brief review of patient files, it was clear that risk assessment is not performed by the nurses for each patient at admission.

In fact, the knowledge deficit problem has two main aspects: the degree of nurses' knowledge, and the application of this knowledge into practice (Maylor and Torrance, 1999a).

Halfens and Eggink (1995) carried out a cross-sectional study to investigate the beliefs and knowledge of nurses about the usefulness of PU prevention interventions which were based on Dutch guidelines, six years after they were launched. For this to be investigated, 373 bedside nurses returned a questionnaire (response rate: 76%), that contained a list of 27 preventive measures developed from the Dutch consensus report on prevention. Nine were judged as useful, eleven as useful only in certain individual cases and seven measures were judged as not useful. The findings also indicated that many measures evaluated by the consensus report as not useful, or only useful in some cases, are still used (such as the use of catheters to prevent maceration, topical creams, massage, and ring-shaped donuts). Moreover, some measures that were evaluated as useful, such as the use of RAS, are applied only on a few wards.

In 2002, new guidelines were launched in the Netherlands so Hulsenboom et al. (2007) conducted a cross-sectional study to investigate nurses' knowledge of these guidelines. The results revealed that the Dutch nurses' knowledge about the usefulness of different preventive intervention measures was moderate. Furthermore, knowledge about non-useful intervention was disappointingly distributed.

Another study conducted by Panagiotopoulou and Kerr (2002) assessed the knowledge of Greek nurses regarding PU risk factors and preventive measures. A questionnaire designed for this purpose was returned by 438 nurses working in a military hospital and the results revealed that, regarding knowledge of risk factors, the extent of the nurses' agreement with expert opinion was 71%. Concerning prevention knowledge, the extent of agreement with expert opinion was only 50%.

These studies show that the nurses might lack knowledge regarding PU prevention or that their knowledge is outdated. Other studies have demonstrated that nurses have knowledge regarding prevention but that this knowledge was not applied in clinical practice.

Pancorbo-Hidalgo et al. (2007) conducted a survey to examine Spanish nurses' level of knowledge and application of available PU prevention and management guidelines. To this end, 740 questionnaires were returned (response rate: 36.9%) from 2006 Registered Nurses and Practical Nurses working at hospitals, elderly care centres, and health centres. The results indicated that rate of application of the guidelines (68.1%) was evidently lower than the level of knowledge (79.1%). A possible explanation for this is that nurses face obstacles that inhibit complete application and this view was supported in Russell's study (1996) of PU care knowledge. The nurses were described to be knowledgeable about special beds, yet this knowledge was not put into practice in the care plan audit.

In the literature, there are some references to works which have analysed the barriers that prevent knowledge of how to prevent PU development being implemented into practice. Moore and Price (2004) found, in a cross-sectional study of nurses, that ill and uncooperative patients were the most commonly cited obstacle to performing PU risk assessments. The other difficulties reported are deficiencies in time, staff, training, resources and guidelines. In addition to these, Panagiotopoulou and Kerr (2002) reported busy wards, under-employed research findings, and lack of access to literature as obstacles to knowledge implementation. Nurses in many nations, including Jordan, face very restricted access to library services and electronic databases in the hospitals. The reported obstacles are not different from those reported by Kallman and Suserud

(2009), where the lack of time, equipment, resources, and patient condition are the most frequently cited barriers.

5.9 SUMMARY

An integration of the QUAN and QUAL phases of Study One of this research has been seen in this section. This enabled a more comprehensive approach to the discussion of the main findings, since the results of both methods were used to answer the research questions. In addition, the results were discussed in light of the literature. The purpose of Study One was to determine how PU data, which is one type of clinical data, is recorded and used in clinical practice. Any investigator of this topic could bring to the surface three main aspects which need to be discussed, and those can be inferred from the title of this study. These are, firstly, the clinical data, which is PU data in this case and which represents the first level in the theoretical framework used for this study; secondly, the recording system, and whether data is recorded on a paper or electronic system, including discussion of the advantages and disadvantages of each system; finally, the use of this data in clinical settings, which, if used appropriately, will lead to the wisdom, according to the Nelson framework (2002). In addition to the above, the strengths and weaknesses and of the research methods used in this research were also discussed.

In regard to Study Two of the research, the reasons for a relatively low prevalence rate in Jordan have been analyzed, and age and the acuity of the Jordanian samples have been seen to be the best available explanations. Additionally, the lack of prevention activity was discussed, where particularly the lack of equipment and the knowledge deficit of Jordanian nurses regarding PU prevention were explored.

In sum, the findings of the two studies which make up the thesis were analyzed in this chapter. The next chapter will present the limitations, recommendations, and conclusions of the research.

CHAPTER SIX: LIMITATIONS, RECOMMENDATIONS AND CONCLUSIONS

6.1 QUICK GUIDE TO THE CHAPTER

This chapter discusses the research limitations encountered during conducting each part of the research. It suggest a recommendations at clinical, administrative and research levels in each part of the research. These recommendations were derived from the research findings, and some were based on the shortcomings of the present work. The chapter also presents the contribution of this research to the body of knowledge, and ends by drawing a conclusion from the different parts and methods of the research.

6.2 RESEARCH LIMITATIONS

Many factors could affect the results of such a study with multi-methods and sites, despite maximum endeavours being made to minimise undesired consequences, and great care being taken during the research design and procedures. These limitations could be addressed in future research, and it is crucial to interpret the findings in terms of these limitations categorised according to the data collection methods:

6.2.1 Questionnaire

Recruiting a sample of TVNs was a very difficult and time-consuming process. The convenience sample technique was used, and this has limitations since it is non-random technique, so representativeness and the generalisation could be affected (Polit and Beck, 2008), but it was the only possible way to recruit such a sample. However, the researcher made all possible efforts to have representatives from each primary and secondary setting in the four countries of the UK, and that was difficult in practice. Some of the contacted organisations (13.5%, n=54) did not respond even after two reminders, leaving their situation regarding PU data recording and utilising unclear and unstudied. Despite constituting a low proportion of the sample, non-respondents could introduce bias as there may be differences in PU data recording and using between them and respondents (Marshall, 2005). Moreover, the response rate was difficult to calculate for this part of the research, since the questionnaire was available online, and we cannot prevent anyone from participating; additionally, the data was collected from two sites, the TVS and NHS. Thus, we cannot comment on the generalisability of the results.

Moreover, it was impossible to recognize the provenance of the questionnaire responses, and for confidentiality reasons no identifying data was solicited. This makes the comparison of the four countries of the UK in recording and utilising of PU data unfeasible, or even knowing the representation of each country in the whole population.

The overlapping between the participants in the targeted settings could be another limitation. The TVNs who are members in the TVS could work in the NHS as well. This could mean that some participants received the questionnaire twice, and the risk of

redundancy increased. However, all measures were taken to reduce that, and only four redundant cases were spotted and deleted.

Completing the questionnaire was dependent on participants' self-reporting, therefore the objectivity of the data given could be influenced by respondents' attitudes (Bowling, 2009). A potential bias could be linked with self-reporting of some Questionnaire items, especially PU prevalence, where it is acknowledged that PU is a quality indicator, and the respondents could give low prevalence figures due to their fear of reporting such sensitive data about their organisations. For this reason, the questionnaire was designed to be anonymous. However, this could distort the reality and accuracy. In our case we cannot tell if the prevalence rate (8%) obtained in the hospitals from the nurses reports is accurate, or whether the respondents underreport the problem, taking into consideration that a systematic method that depended on patient inspection revealed a prevalence of 21.9% in the UK hospitals (Vanderwee et al., 2007a).

6.2.2 Interviews

There was an inequality in the number of interviewees between the primary and secondary settings (n=6 and 10, respectively), which was out of control. It was not the aim of Study One to obtain a tightly representative sample in statistical terms, but to interview a sample of TVNs who were representative of the healthcare organisations in the UK to explore how PU data was recorded and utilised in practice. Despite the limited number of informants from the primary settings, the results were clearly presented and demonstrate that there were no great differences between the two settings in the topic investigated.

The final limitation associated with the interviews was that the interviewees might provide socially acceptable answers (May, 2001), especially as given the sensitivity of the topic explored (PU is closely associated with quality of care). However, most of the TVNs interviewed mentioned that there is an underreporting of PU cases in their settings; one respondent gave actual numbers from his setting, stating that only 46 cases were reported in the whole community. The ease of giving candid responses to such

sensitive data could be referred to the fact that the interviewees were assured that this research is anonymous, and no identifiable data would be presented in any output.

6.2.3 Prevalence survey

The prevalence survey makes an important contribution not only to the Jordanian or Arabic populations, but also to the international prevalence literature. But, it has some limitations that could affect the generalisation of the results, such as sample size, whereby the sample was from only two hospitals, which is not representative of the Jordanian population. This was due to the limited resources of the research in terms of time, money and manpower. However, the two hospitals were chosen carefully; one represents the general hospitals (these hospitals have 38.7% of total hospital beds in Jordan) (MOH, 2008), and the other represents the university hospitals (these hospitals have 9.2% of total hospital beds in Jordan) (MOH, 2008).

Moreover, the selection of these hospitals was non-random, which could contain self-selection bias, and increase threats to external validity (Polit and Beck, 2008), thus caution should be taken when generalising the findings. Probability is a more respected approach than non-probability sampling in terms of the confidence that can be placed in the representativeness of the sample (Bowling, 2009).

Prevalence studies are snapshots of a specific problem in a certain time and place. Caution should be taken when interpreting their findings, and it is not possible to deem them an absolute measure of care quality (Wann-Hansson et al., 2008). An incidence study would be more powerful. Furthermore, prevalence studies are unable to distinguish between those admitted to a hospital with a PU, and those developing the condition after admission (Defloor et al., 2002). However, the prevalence survey in the Jordanian acute care settings provided essential information about the magnitude of the PU problem, and the extent of preventive care.

The exclusion criteria of Study Two could contain some limitations, whereby some wards and specialties were excluded from the study; this could unreasonably elevate the

calculated prevalence rate. However, that was followed to ensure comparability with EPUAP study (Vanderwee et al., 2007a), since PU is seldom reported in these areas.

Despite that fact that several PU preventive measures exist in the literature, data on only two of these interventions was collected. Actually, this is the situation in Jordan, where these interventions are the most commonly used. Moreover, data on repositioning was collected from nurses and their documentation, and it was impossible to verify whether these interventions were provided; these data could be overestimated and the real figures in much lower. This was also noted as a limitation in the European study (Vanderwee et al., 2007a).

The RAS used in this study (Braden scale) has not been formerly tested in Jordan, but it has been broadly studied and accredited as giving optimal validation. The face and content validity were measured by experts, and it was used in the EPUAP study (Vanderwee et al., 2007a).

6.3 RESEARCH RECOMMENDATIONS

Despite the study limitations given in the preceding section, the study is still deemed important for nurses in the UK and in Jordan, establishing a better understanding of PU data, its recording and utilising. However, as it is a new subject being explored, avenues are open for numerous recommendations at the clinical, administrative and research levels in each study of the research:

6.3.1 Study One (UK)

6.3.1.1 Clinical level:

The nurses in different care settings should be accountable in reporting PU cases to overcome the problem of the underreporting of PU that this study and many previous ones emphasise. The blame culture that nurses operate within, as the QUAL results showed, should be changed. Accurate and timely reporting techniques should be used in

healthcare organisations, and nurses should follow the guidelines of these organisations carefully.

Nurses should always collect and record accurate and high quality data, which can be transformed by the TVNs into information and knowledge that can be used at different organisational levels. Moreover, the nurses in practice should be able to benefit from the utilisation of the knowledge in practice, as example they should benefit from the TV reports that TVN generate at regular intervals to decrease the incidence of PU in their departments.

6.3.1.2 Administrative level:

The TV departments should be able to improve the nurses' knowledge regarding PU assessment and prevention, since that the problem of underreporting could be based on lack of knowledge of PU. This can be possible by providing ongoing continuing education and training programs. The nurses should be able to know how to record, report and refer PU cases and complied with the organisation's criteria of undertaking these activities. The TVNs should be able to continuously monitor the uses of RAS and GSs according to followed policies.

The TVN should engage all nursing staffs in different settings in any PU audit conducted in practice, in order to improve the nurse's skills in these activities. Where any PU audit, certainly could contain elements on prevalence and incidence calculating, risk assessing, ulcer grading and prevention prescribing. The nurses can gain benefits from all these elements by participating in such audits.

6.3.1.3 Research level:

The research concluded with as yet unanswered questions regarding the accuracy and quality of PU data recorded using different systems. Further work is needed to evaluate the recording of PU data in electronic and paper systems in the same setting by the same users at different points in time. For example, research could be conducted in the same settings using a combination system for recording the same data, or in settings using paper recording which are in transition to electronic formats. Alternatively, a

comparison could be made between the two systems in a hospital shortly after an electronic system had been implemented.

6.3.2 Study Two (Jordan)

6.3.2.1 Clinical level:

Data on PU prevalence could increase the awareness of the problem, and allocate resources appropriately, which could enhance patient care and reduce the organisational adverse events (Gallagher et al., 2008).

The results show that prevention methods were sparsely provided to patients in need of them. However, the dearth of previous work in Jordan that could be used as a comparison make it difficult to assert whether the results show an average or an extreme of the continuum in prevalence and prevention practice in Jordan. Since this could be related to lack of knowledge, education and training should be provided on PU assessment, prevention, and treatment at undergraduate and postgraduate level for nursing staff and even nursing students. These training programmes should be organised, and have mandatory components, especially at the induction phase when the nurses enter an organisation.

Nurses in clinical settings should be aware of the resources available for them to prevent PU. Timely access to suitable equipment and expert's advice are necessary. Lack of equipment, as cited by some head nurses, could be a possible explanation for the limited intervention provided.

The nurses should be liable regarding PU prevention, whereby it should be provided to those in need of it. Nurses should receive support and incentives from their managers when swift and appropriate preventive care is provided.

6.3.2.2 Administrative level:

Prevention programs should be adopted urgently in Jordan by the decision makers, taking into account the absence of national prevention guidelines, and the limited preventive care provided by the nurses as the present study proved. International

guidelines from EPUAP and NAPUP, or any guidance that based on research evidence can be adopted.

Risk assessments in Jordan are based mainly on clinical judgement, and there is minimal use of RASs. Even one hospital of this study used Braden scale, a quick review of the patient files showed that risk assessment was not performed at admission for every patient. Thus, the nursing managers should monitor the implementation of RAS, then monitor the effectiveness and correctness of this application. Integration between risk assessment and the decision to prescribe prevention should be scrutinised.

The administration of healthcare organisations should notify the nurses of the equipment available. In this study, the numbers of equipments in the hospitals were not counted, since this is beyond the objectives of this research, but it is clear from the limited prevention provided. Financial support should be available to purchase more equipment if the reason is lack of it.

PU point prevalence surveys should be repeated on a regular basis, like annually. As these surveys are time consuming and labour intensive, a need for a computerised record system that can offer regular data promptly and simply should be adopted.

6.3.2.3 Research level:

Similar prevalence surveys in Jordan with a standardised methodology, and larger number of institutions and different types of patients, should be conducted on a regular basis.

An action research programme could be done to concentrate on preventive activities provided for patients identified at risk using Braden score, clinical judgment and other measures (for example serum albumin level). These may include assessment of the level of knowledge of nursing staff regarding PU prevention, or any other elements.

The raw data from this study can be merged with similar data from other countries to assess the effects of demographic variables on prevalence and preventive measures.

6.4 CONTRIBUTION OF THE RESEARCH TO KNOWLEDGE

The present research contributes to the body of nursing knowledge in the field of PU data recording and utilisation of this clinical data. In fact, a plethora of research is available about PU data in general, concerning prevalence, incidence, risk assessment, ulcer grading, prevention and management. However, this research is the first of its kind that explores how all these data are recorded and used in clinical settings. Similarly, many studies exist that investigate the electronic and paper recording system in general and for different patient groups, settings and specialities. Only two studies have tried to compare the accuracy in recording PU prevalence and prevention, and nursing documentation, before and after implementing electronic recording system in the same setting, both of which were located in Sweden (Gunningberg et al., 2008, Gunningberg et al., 2009). Thus, recording different types of PU data in electronic and paper systems are rarely examined, and this study draws a conclusion about the UK settings.

The study objectives used in this study were very different from those used in Gunningberg et al.'s studies in 2008 and 2009. In the latter, patients were inspected and their records reviewed to assess the accuracy and quality of nursing documentation by comparing the inspection results with the recorded notes. However, the current study was not assessing accuracy or quality of data, being concerned with how these data were recorded in both electronic and paper systems, and how they were utilised by clinicians, which is an area not explored by the aforementioned studies.

In the Jordanian part of the study, no previous works were available about the prevalence of PUs, as well as patients' risk status and preventive strategies used. This is applicable to the broader Arab world as well, where only one incidence study has been located in Saudi Arabia (Saleh et al., 2009), which makes this study the groundwork for other research in relation to this area, and a foundation for Jordanian and Arabic nursing studies on PU.

6.5 RESEARCH CONCLUSION

This study used different methods in different settings and sites to address the research questions. This comprehensive approach was necessary to cover the topic completely. The study yielded the following valuable conclusions:

Several types of PU data exist, including prevalence, risk assessment, ulcer grading and prevention. Regarding the prevalence data, the QUAN phase of Study One showed that prevalence rate was significantly different between the different care settings in the UK; the secondary settings have the highest prevalence rate. However, it is difficult to compare the obtained prevalence rate in this phase of the study with other prevalence literature from the UK due to methodological differences.

The TVNs reported in the questionnaire that the prevalence rate given was dependent mainly on prevalence survey findings, done commonly on annual basis by the TVNs in different settings. However, the QUAL phase of the study explored that thoroughly, and the findings revealed that PU audits can be conducted by other different methods besides the prevalence survey; that is, reviewing the data available on the recording systems, and relying on the nurses to report these data.

Arguably, carrying out any prevalence survey requires tools to accomplish it. It was clear from the QUAN phase that in the UK, the clinicians depended on the Waterlow scale to assess PU risk, and they employed the EPUAP scale as a method of grading PUs.

The reporting and referring of PU cases to TVN could be accomplished on paper, electronic system, or on clinical incident reporting system. However, the underreporting problem exists regardless of the system used to report PU cases. As a referral policy, the TVN follow the most complicated cases that the usual prevention and management protocols failed to minimise its scale.

Regarding the recording of PU data, the QUAN phase showed that PU data was recorded mainly on a combination system between paper and electronic system; completely electronic recording systems were limitedly available for PU data. In this

study, the advantages and disadvantages of each system that the nurses experienced during recording PU data have been explored. Although the accuracy and quality of data in each system and the recommendation of adoption of one system is beyond the scope of this research, some interviewees commented that there was no difference between the two systems in this regard. In fact, this could be a worthy area for future research.

The electronic recording system can generate reports easily and quickly by the TVNs. The system enables the field nurses to immediately record PU data, and to report and refer PU cases to TVN, which could improve the care provided to the patients by timely intervening. Moreover, the TVN can track the patients on the system and monitor the assessment and prevention activities provided to them, so the progress can be evaluated. The electronic data is available and accessible all the time from different places by different users at the same time, which is could save the clinicians' time, and make it easy to organize the huge work of large organisations. The mandatory filling fields that available in the electronic system for some type of data, like assessment data will ensure the completeness of the record and could be used as education tool. Despite all these advantages, some disadvantages exist as well. These systems could crash and consequently the access of data would be affected, in addition to the extensive training needed for these systems, which makes them time-consuming. Many other obstacles for using these systems were reported, such as the computer illiteracy of the nurses, the high operational cost, and the confidentiality and privacy issues.

Although the paper system is familiar to use and flexible in recording PU data, many disadvantages were attached to its use. The difficulty in recording, searching and retrieving the data make it time-consuming. Moreover, these systems are available and accessible only for one user at once. The noted incompleteness of these systems in recording PU data constitutes a major disadvantage for using such systems.

The utilisation of PU data either in paper or electronic format has been explored. These data can be used to generate reports, which in turn could be directed to the administrative level as a feedback about the existing situation. The reports that contain figures such as prevalence and incidence could be used to evaluate interventions, monitor the quality, and support the decision of purchasing new equipments, employing

more nurses or offering more training. In some situations, these data could be used for safeguarding procedures. Surprisingly, the interviews discovered that some TVNs in different settings believed that some aspects of PU data are useless, such as prevalence data, so they discontinue conducting or even collecting these data in their settings.

In Jordan, a point prevalence survey carried out by the researcher revealed that PU prevalence rate was lower than that published in studies that utilised the same methodology. The younger age and decreased patient frailty for the Jordanian sample could be the best explanations. Despite the relatively low prevalence rate in Jordan, a very small percentage of at risk patients receive adequate prevention. The best rationale for that could be lack of equipment or knowledge of Jordanian nurses regarding PU assessment and prevention. However, this should increase the awareness for a PU prevention scheme in Jordan.

6.6 SUMMARY

Despite the strengths of this research mentioned earlier, there were limitations to the results; the sample of TVNs that completed the questionnaire was convenience, some organisations not respond to the researcher's invitations, difficulty of calculating the response rate, inability to perform comparison between the four countries of the UK in the topic investigated, and finally the subjectivity of respondents in filling self-report questionnaires. The unequal number of informants between the primary and secondary settings could be considered as a limitation to the reported findings, in addition to the fact that TVN interviewed could give social accepted answers. In the second study conducted in Jordan, the hospitals were chosen conveniently, the sample size was small (relatively), some wards were excluded, and patient records were relied upon to collect data about repositioning.

The researcher translates the research results into recommendations that can be employed at different levels. In Study One, the nurses should record and report PU data accurately and timely. The TVNs have to provide ongoing and updated training in PU field. Further research is recommended to investigate the accuracy and quality of PU data on different recording systems. In Jordan, education and training should be provided to nurses about PU; in addition to that they should be aware of the preventive facilities that exist in their organisations. Prevention guidelines and RASs should be adopted. The floor is open for action research to repeat the study in different settings and institutions, with further focus on the preventive measures, and the nurses' knowledge of these.

Study One is the first of its kind, in exploring how PU data is recorded and used in practice, especially using mixed-method approach for this purpose. Study Two was the first in Jordan and the Arab world to identify the prevalence rate in acute care settings. These obtained findings contribute to the body of nursing knowledge.

The conclusions derived from Study One emphasise that there is a difference between the reported prevalence rates in different organisations. The prevalence survey that conducted annually by the TVNs is the most common method of conducting PU audit.

Reviewing the recording systems and relaying on nurses are other available methods. Waterlow RAS and EPUAP GS are the most commonly used tools. Nurses and TVNs can record, report, and refer PU data using paper, electronic, or combination format of recording. Each system has an advantages and disadvantages. Although PU data have many uses in practice, some TVNs believe that some types of it are useless. Study Two revealed that PU prevalence in Jordan is lower than international rates, and a limited proportion of at-risk patients receive adequate preventive care.

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APPENDICES CONTENT

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APPENDIX A1: Table of databases searched, keywords, and number of hits.

Keyword	Medline	CINAHL	BNI	IBSS&ASSIA	Web of knowledge
<i>Clinical data</i>					
Clinical data	69110	7625	55	578	12111
Patient medical record	363	106	17	2	267
Clinical data/ Recording	615	67	3	7	50
Electronic health record	983	520	52	48	631
Paper health record	14	4	1	0	11
Clinical data/ Utilising	27	7	0	0	1
<i>PU data</i>					
Pressure ulcer	8731	7397	764	177	1285
Pressure ulcer data	45	58	9	0	25
Pressure ulcer prevalence	156	172	25	13	98
Pressure ulcer risk assessment	95	111	51	27	69
Braden scale/ Validity/ Reliability	18	58	4	6	6
Pressure ulcer/ Grading	42	36	14	7	5
EPUAP/ Classification	10	8	3	3	2
Pressure ulcer prevention/ Support surfaces	125	129	4	1	4
Pressure ulcer prevention/ Repositioning	56	52	4	2	1
<i>Combinations</i>					
Recording/ Pressure ulcer data	1	1	0	0	0
Electronic recording/ Pressure ulcer data	1	1	0	0	0
Documentation/ Pressure ulcer data	6	5	2	0	0
Electronic health record/ Pressure ulcer	5	4	2	0	0
Utilising (using)/ Pressure ulcer data	1 (19)	1(23)	0(4)	0	0
Reporting/ Pressure ulcer data	1	4	0	0	0

APPENDIX A2: Quality scale used to critique the included articles in the reviews
(Hawker et al. (2002))

Author and title: _____

Date: _____

	Good (4)	Fair (3)	Poor (2)	Very Poor (1)	Comment
1. Abstract and title					
2. Introduction and aims					
3. Method and data					
4. Sampling					
5. Data analysis					
6. Ethics and bias					
7. Findings/results					
8. Transferability/generalizability					
9. Implications and usefulness					
Total score					
Key	<10: Very poor 10-19: Poor 20-29: Fair 30-40: Good				

<p>1. Abstract and title: Did they provide a clear description of the study? Good: Structured abstract with full information and clear title. Fair :Abstract with most of the information. Poor :Inadequate abstract. Very Poor No abstract.</p>
<p>2. Introduction and aims: Was there a good background and clear statement of the aims of the research? Good Full but concise background to discussion/study containing up-to date literature review and highlighting gaps in knowledge. Clear statement of aim AND objectives including research questions. Fair Some background and literature review. Research questions outlined. Poor Some background but no aim/objectives/questions, OR Aims/objectives but inadequate background. Very Poor No mention of aims/objectives. No background or literature review.</p>
<p>3. Method and data: Is the method appropriate and clearly explained? Good Method is appropriate and described clearly (e.g., questionnaires included). Clear details of the data collection and recording. Fair Method appropriate, description could be better. Data described. Poor Questionable whether method is appropriate. Method described inadequately. Little description of data. Very Poor No mention of method, AND/OR Method inappropriate, AND/OR No details of data.</p>
<p>4. Sampling: Was the sampling strategy appropriate to address the aims? Good Details (age/gender/race/context) of who was studied and how they were recruited.</p>

<p>Why this group was targeted. The sample size was justified for the study. Response rates shown and explained. Fair Sample size justified. Most information given, but some missing. Poor Sampling mentioned but few descriptive details. Very Poor No details of sample.</p>
<p>5. Data analysis: Was the description of the data analysis sufficiently rigorous? Good Clear description of how analysis was done. Qualitative studies: Description of how themes derived/ respondent validation or triangulation. Quantitative studies: Reasons for tests selected hypothesis driven/ numbers add up/statistical significance discussed. Fair Qualitative: Descriptive discussion of analysis. Quantitative. Poor Minimal details about analysis. Very Poor No discussion of analysis.</p>
<p>6. Ethics and bias: Have ethical issues been addressed, and what has necessary ethical approval gained? Has the relationship between researchers and participants been adequately considered? Good Ethics: Where necessary issues of confidentiality, sensitivity, and consent were addressed. Bias: Researcher was reflexive and/or aware of own bias. Fair Lip service was paid to above (i.e., these issues were acknowledged). Poor Brief mention of issues. Very Poor No mention of issues.</p>
<p>7. Results: Is there a clear statement of the findings? Good Findings explicit, easy to understand, and in logical progression. Tables, if present, are explained in text. Results relate directly to aims. Sufficient data are presented to support findings. Fair Findings mentioned but more explanation could be given. Data presented relate directly to results. Poor Findings presented haphazardly, not explained, and do not progress logically from results. Very Poor Findings not mentioned or do not relate to aims.</p>
<p>8. Transferability or generalizability: Are the findings of this study transferable (generalizable) to a wider population? Good Context and setting of the study is described sufficiently to allow comparison with other contexts and settings, plus high score in Question 4 (sampling). Fair Some context and setting described, but more needed to replicate or compare the study with others, PLUS fair score or higher in Question 4. Poor Minimal description of context/setting. Very Poor No description of context/setting.</p>
<p>9. Implications and usefulness: How important are these findings to policy and practice? Good Contributes something new and/or different in terms of understanding/insight or perspective. Suggests ideas for further research. Suggests implications for policy and/or practice. Fair Two of the above (state what is missing in comments). Poor Only one of the above. Very Poor None of the above.</p>

APPENDIX A3: Table of articles included in the pressure ulcer prevalence review.

Country	Prevalence (results)	Author(s) and aim(s)	Design	Method	Remarks	Hawker et al. (2002) Scale Score
Germany	Period prevalence 1.4%, point prevalence 5.3%. Incidence 0.6%.	Stausberg et al., (2005). Point and period prevalence, and incidence in hospital.	Cohort, cross-sectional survey	Reviewing the recording system for PU data for 25075 cases admitted to the hospital over period of time.	Reviewing the recording system	28: Fair Brief mention of ethical issues, minimal details about analysis.
	Prevalence 12%, incidence 6%.	Schue and Langemo, (1999). Incidence and prevalence in long term rehabilitation setting.	Retrospective	Retrospective review of 170 patients' charts and follow the file for 1 year	Retrospective review	25: Fair Objective not mentioned. No details about the method.
	In hospital: 2002: 25.1% and in 2003: 24.2%. In nursing home: 2002: 17.3% and 2003: 12.5%.	Lahmann et al., (2006b). Compare prevalence in 2 years (2002 & 2003) and in hospital and nursing home.	A point prevalence survey	21574 patients and residents in 147 different kinds of institutions. The nurses trained on examining the patients using NPUAP.	Participation voluntary, not random	33: Good No mention of the ethical issues.
	Overall prevalence 11.7% (excluding grade 1: 5.2%)	Lahmann et al.(2005). Prevalence in hospitals and nursing homes.	Descriptive, point prevalence	Trained ward nurses assess 11584 patients and residents in 66 institutions in 2001 and 2002 on one specific day. The data collected on questionnaire based on the Dutch National Registration Project of PUs.	Braden (cut-off 20) and NPUAP scales. Sample was not representative, participation voluntary not at random. Response bias due to missing data. Relay on nurses	34: Good More detailed information about the ethical consideration needed.
	2002-2005: 30% 2006: 16.2%.	Shahin et al., (2008b). Prevalence in intensive	Cross sectional, point	1760 patients in different hospitals from the years 2002-2006 was assessed in a	Relay on nurses. Not all ICUs involved in the study.	31: Good Title not informative, no settings included. Ethical

	Prevalence declined from 12.5% (2002) to 5% (2008)	care patients (Lahmann et al., 2010). Prevalence in German long term care institutions from 2002-2008	prevalence Cross sectional	day every April by the trained ward nurses. Skin of 18706 residents from 218 long term care institutions (response rate 77.5%) was examined by qualified trained nurses.	Different participant numbers and institutions in each year, lead to differences in patient characteristics. Unconscious patient excluded (decrease the prevalence rate).	issues not mentioned in clear section. 33: Good Findings mentioned but more explanation could be given.
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Sweden	University hospital 23%, general hospital 13.2%, nursing home 20%	Gunningberg, 2004. prevalence in 3 type of hospitals	Cross sectional survey	695 patients from different hospitals, a university hospital (n=612), general hospital (n=38) & nursing home (n=45) assessed by 2 trained nurses using EPUAP methodology.	Small sample size especially from general hospital and nursing home (not representative). The participation was voluntary.	30: Good More background and literature review data required.
	Geriatric (59.3%), intensive care (23.3%), acute care (18.5%) neurological care (8.3%)	Gunningberg, 2005. Prevalence in different care groups.	Cross sectional survey	612 patients assessed using the EPUAP methodology by 2 trained nurses. Risk assessed using Braden.	One hospital included.	36: Good Adequate background, method and results.
	33.3% in 2002 (Grade 1 excluded: 10.9%) 28.2% in 2004 (Grade 1 excluded: 14.1%)	Gunningberg, 2006. Compare audits between 2 years in a university hospital.	One day cross sectional prevalence survey.	369 patients from a university hospital assessed by 2 trained nurses using EPUAP system. Risk assessed using Braden.	Prevalence shortcomings	36: Good More descriptions of the Sample required.
	27%	Wann-Hansson et al. 2008. Prevalence in acute care hospital	Point prevalence, cross sectional survey	Group of 3 trained nurses inspect 535 patients using the methodology of EPUAP.	One hospital included.	34: Good Sampling mentioned but more descriptive details required.
Netherlands	23.1%.	Bours et al., 2002. First national prevalence in Netherlands	1 day prevalence study	16344 patients in 89 institutions were assessed by 2 trained nurses (one from the ward and other from out the ward) using EPUAP methodology.	There is some bias in data collection, where the institutions need to pay to participate, which could lower the participation rate.	29: Fair Inadequate methodological information in the abstract, no discussion of the analysis.
	28.7%	(Bours et al., 2001). Prevalence in Dutch ICUs	Cross sectional	The data collected from the study above, where the ICU units data collated together (n= 850 patients)	Same as above (just presenting the ICU data separately)	33: Good Some background and literature review.

	<p>Prevalence in Netherlands 33% (excluding grade 1: 18%). Germany was 28% (excluding grade 1: 14%).</p> <p>Incidence 6% per week Prevalence 12.8%-20.3% per week.</p> <p>The prevalence in Dutch nursing home 31.4% and 18.1% in hospital. While in the Germany sample, the nursing home 6.4% and hospital 9%.</p> <p>Prevalence drop from 8.5% in 2001 to 3.4% in 2008.</p>	<p>Tannen et al., 2004. Compare prevalence between Germany & Netherlands in acute care settings.</p> <p>Schoonhoven et al., 2007. Prevalence & incidence in hospitalize patients.</p> <p>Tannen et al., 2008. Compare prevalence between Germany & Netherlands in hospitals & nursing home.</p> <p>(Amir et al., 2011). PU prevalence in Dutch general hospitals.</p>	<p>Cross sectional survey</p> <p>Prospective inception cohort study</p> <p>Cross sectional survey</p> <p>Retrospective study</p>	<p>8734 patients from 42 Dutch & 2.832 patients from 10 German hospitals assessed by trained nurses using EPUAP methodology. Braden scale used to assess the risk.</p> <p>Single nurse researcher inspect patients who are free from ulcer, 2 days after admission, then once weekly, till PU occur, discharged or up to 12 weeks. PU was graded based on EPUAP. The total number of patients included was 1229 patients from 2 hospitals; general and teaching hospitals.</p> <p>29 German and 71 Dutch nursing home, and 39 German and 60 Dutch hospitals. Trained ward nurses examined all patients using EPUAP staging.</p> <p>Dutch national database was reviewed from 2001-2008.</p>	<p>Since the same method, and forms used in the two countries. A higher prevalence noted in one of them.</p> <p>PU considered present if only stage 2 and above Not selected non random sample. Prevalence and incidence calculated per week.</p> <p>Relay on nurses Selection bias (voluntary participation)</p> <p>Retrospective, different facilities participated every year, which could affect the results.</p>	<p>29: Fair Objectives not mentioned, method described inadequately.</p> <p>35: Good Objectives not clearly stated.</p> <p>34: Good No clear result data in the abstract.</p> <p>32: Good Method appropriate, description could be better.</p>
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USA	Prevalence: 15%, Incidence: 7%	(Whittington et al., 2000) National prevalence and incidence in the USA	Prevalence calculated in predetermined 24-hours and incidence over length of stay.	Teams (RN and other professional like; LPN, physiotherapist) assessed 17560 patients using NPAUP.	Training not mentioned	30: Good More explanation of the result required. Detailed information about sampling and analysis not given.
	29% in 2002 19% in 2004	Horn et al., 2004. Prevalence in long term care	Retrospective cohort study	1524 residents living in 95 long term care facility, their files followed to up 12 weeks	Include only at risk patients (Braden < 17). Retrospective	31: Good Inadequate background about the problem.
	Prevalence 10%-18% in general acute care, 2.3%-28% in long-term care.	American National Pressure Ulcer Advisory Panel (NPUAP, 2001).	Cross sectional survey	NPUAP		29: Fair Method not described adequately.
	Prevalence 14% (2001 and 2002) to 17% (1999). Incidence 7% (2001, 2003, 2004), 9% (2000).	(Whittington and Briones, 2004). National prevalence & incidence over 6 years in acute care settings.	One day prevalence, Incidence measured over the length of stay	The staff members in the participating organisations receive educational videos, the forms, and instructions. Then, they assess the patients according NPUAP and complete the forms. 240 organisations in 2004.	Relaying on staff nurses.	28: Fair Inadequate background, more detailed data about the method required.
	13.2% in 2003, 13.6% in 2004, and 14.4% in 2005	VanGilder, 2006. Prevalence in long term facility	One day prevalence	52 long term care facility with 6242 patients were surveyed over 3 years (2003-2005).	Relaying on facilities staffs.	26: Fair Objectives of the work not mentioned, some detailed data about the method missing.
	Prevalence between 1999-2005 (15%). Before 1999 (9.2% - 11.1%)	Vangilder et al., 2008. International prevalence from 1989-2005 (US, Canada, Australia, KSA,	One day prevalence	651 acute and long term care facilities with 85838 patients assessed on single day by the facilities staffs using		31: Good Descriptive information about the sample and ethical issues missing.

	Prevalence ranged 12-19.7%. Incidence 0-5.4%.	UAE) (mainly from US, only 1% international) Jenkins and O'Neal (2010). Incidence and prevalence in acute care settings in a northern California hospital	Cross sectional survey	NPUAP guidelines Prevalence was measured quarterly on predetermined days using standard data collection tool. Incidence measured over patients' length of stay.		33: Good No adequate information about the analysis plan.
Canada	Overall prevalence 26.0%: - acute care settings: 25.1% - Non-acute care settings: 29.9%. - Mixed health settings: 22.1% - Community care: 15.1%	Woodbury and Houghton, 2004. Prevalence in Canada	Cross sectional	18 acute care facilities involving 4831 patients, 23 non-acute care facilities with 3390 patients, 19 mixed healthcare settings with 4200 patients, and five communities care agencies that surveyed 1681 patients. Examined based on NPUAP guidelines.	Not all healthcare settings in Canada included	32: Good Inadequate background, more description of the sample required.
France	Prevalence was 8.9%.	Barrois et al., 2008. National prevalence in all French hospitals.	A cross-sectional study	Data were collected using self-administered questionnaires by the wards nurses using the NPUAP staging system. The data collected from 37307 inpatients in 1149 hospitals over one week.	University hospitals were excluded (n=29). The nurses' skills in PU assessment are unclear, no training provided. NPUAP is unfamiliar to them, they may under or over estimate the problem (undermined reliability).	29: Fair Inadequate background and literature review, few description of: sample, analysis methods, and ethics.

Finland	6.4%	Lepisto et al., 2001. Prevalence in acute and long term hospitals in Finland	One day prevalence	2563 patients from 11 hospitals assessed using EPUAP guidelines, and filled in questionnaires by nurses.	Rely on the nurses to fill forms. Nurses instructed on how to fill the form. No formal training. Develop Classification system based on Shea, EPUAP, and IEAT (international association of enterostomal therapy)	35: Good Some information are missing from the abstract (methodology and clear conclusion)
Iceland	8.9%	Thoroddsen, 1999. National prevalence in Iceland.	A cross sectional study	Questionnaires were sent to 22 hospitals in which all patients age 18 and above included, so the nurses assessed 642 patients using EPUAP guidelines, and return the questionnaire back. Community hospitals included as well. The grading system used in this study was Shea's system.	Relay on nurses, no training provided to them.	33: Good Inadequate abstract: no method and results data.
Ireland	18.5%.	Gallagher et al., 2008. Prevalence in 3 teaching hospitals.	Point prevalence	8 trained teams of one doctor and one nurse visited 672 adult patients over a 2-day period in 3 university teaching hospitals. Assessment done using EPUAP	Only three hospitals, and only teaching hospitals, the choosing of these hospitals is unclear.	31: Good Minimal details about analysis, no suggestion of future research.
Singapore	Prevalence 18.1% Incidence 8.1%	Chan et al., 2005. Prevalence and incidence in large hospital.	Prevalence: cross-sectional, incidence: prospective	Trained 8 teams of 3 RNs assessed 666 patients. The first nurse assesses the risk using Braden. The second examined patients for PU	Just for up to 28 days, it is better to follow until discharge, especially which the developed ulcer was	36: Good Sufficient data to support findings.

			cohort study.	and grade if found according EPUAP. The third nurse record demographical data. If no ulcer found included for the incidence part, where followed twice weekly until discharge or for 28 days.	superficial, maximum grade 2. The use of prevention could decrease the incidence.	
Turkey	11.6%	(Uzun and Tan, 2007). Prevalence in medical and surgical units in one acute university hospital	Cross sectional study	Authors and 3 trained nurse assistants examined 344 consented patients using NPUAP. The risk assessed using Braden	One site only.	32: Good Inadequate information in the abstract, minimal mention of the ethical considerations.
Northern New South Wales-Australia	6%	(Pearson et al., 2000). Prevalence in acute care hospitals	Cross sectional study	The ward nurses examined any patient in the 18 participated acute care hospitals identified as having PU (n=634) using NPUAP. Training provided.	Participation for hospital was voluntary (18/25), non-response bias. They developed new instrument.	29: Fair No clear objective, minimal description of the settings, more explanations about the results tables are required.
India	4.94%	(Chauhan et al., 2005). Prevalence in hospitalized patients	Point prevalence study	20 wards included medical, neurology, rheumatology, intensive care, surgery and oncology included in the study. Thus, 445 patients examined by staffs.	One single site only, small sample size. Relay on staff. Training not mentioned.	17: Poor Minimal background data, objectives not mentioned, inadequate information about: method, analysis, results, and ethics.
Spain	35.7%	Casimiro et al., 2002. Prevalence in elderly	1 day Cross-sectional prevalence survey	827 elderly people from 50 Spanish geriatric facilities who are older than 60 year assessed by filling a questionnaire by the nurses	Relay on nurses to fill questionnaire, no training provided.	31: Good No clear objective stated, inadequate sample data.
Belgium	6.8%.	Paquay et al., 2008. Prevalence in nursing home	Cross sectional survey	2779 residents of 9 regional nursing home assessed by the nurses in these home	Relay on nurses, who receive limited training.	35: Good Findings mentioned but more explanation

				using EPAUP forms.	Sample not represented to all nursing home in Belgium.	required.
Italy	27%	Capon et al., 2007. Prevalence in long term care units.	Cross sectional	571 patients from 10 long-term units were visited twice. Trained staffs in each unit collect data about (demographical data, medical history, preventions, ADL-activity of daily living scale, SPMSQ-short portable mental state questionnaire scale, diet, risk using Braden scale), and a single trained nurse assess all patients for presence of PU, number, location and grade according EPUAP.	Lack of the used scales validity. Poor inter-rater agreement between the staffs. Relaying on staff.	34: Good More descriptive details of the sample required.
	Prevalence: 22.9% Incidence: 6.7%	Hendrichova et al. (2010). Prevalence and incidence in cancer patients in a palliative care service.	Descriptive, retrospective	4141 records were audited retrospectively for patients admitted over 6 months period.	Retrospective, single site study.	29: Fair No clear conclusion in the abstract, inadequate data about: sampling, analysis plan and ethics.

China	Prevalence: 1.8%	Zhao et al. (2010). To obtain baseline information, no previous data.	One day cross sectional descriptive study.	Trained clinicians audited 2913 patients in a teaching hospital using tool designed by national database of nursing quality indicators (NDNQI). Clinicians received training.	Norton and NPAUP scales. Include from age 1 year. Good sample size but one hospital.	31: Good Findings given not explained thoroughly.
Brazil	Study day 1: prevalence 11.4% Study day 2: prevalence 10.3%	Cardoso et al. (2010). PU prevalence in hospitalised patients over 2 different days.	Cross sectional study	The first author assessed all patients in two different days in the same university hospital.	Braden & NPUAP scales. Prevention data not collected. The researcher (1 st author) assessed only the patients that previously identified as having PU, and the impaired mobility patient only	29: Fair Method described inadequately, little descriptions of the data.
	Prevalence in May: 12.7%. Prevalence in August: 9.2%.	Chacon et al.(2009). Prevalence among elderly people in 6 long stay institutions.	Cross sectional	The first author assessed the elderly in two different days. 181 elderly in May and 184 in August 2007. Risk assesses using Braden, and ulcer graded using NPAUP.	Not representative sample, where only 365 elderly included at the time that people aged above 60 in Brazil are 14.5 million. Unclear how these 6 institutions chosen. The skills of the researcher to collect the data not mentioned.	31: Good Little description of the sample and analysis.

<i>Japan</i>	Overall prevalence 4.26%	(Sanada et al., 2008). PU prevalence in Japanese hospitals	Retrospective	Questionnaire sent to 5000 hospitals (out of 9230 hospitals) - above the 300 beds to review their database in specific date. The response rate was 51.6%.	Retrospective. Non-response bias: 48.4%. Training how to fill the forms not mentioned.	27: Fair Insufficient literature provided, gaps not highlighted. Inadequate description of the method used, missing of the data of: sampling and ethical issues.
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APPENDIX A4: NPUAP staging scale

Grade	Definition
1	Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.
2	Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough. May also present as an intact or open/ruptured serum-filled blister.
3	Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscles are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling.
4	Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often include undermining and tunneling.
Source: (NPUAP, 2007)	

APPENDIX A5: EPUAP grading scale

Grade	Short description	Definition
1	Nonblanchable erythema of intact skin	Nonblanchable erythema of intact skin. Discoloration of the skin, warmth, edema, induration, or hardness may also be used as indicators, particularly on individuals with darker skin.
2	Blister	Partial-thickness skin loss involving epidermis, dermis, or both. The ulcer is superficial and presents clinically as an abrasion or blister.
3	Superficial ulcer	Full-thickness skin loss involving damage to or necrosis of subcutaneous tissue that may extend down to, but not through, underlying fascia.
4	Deep ulcer	Extensive destruction, tissue necrosis, or damage to muscle, bone, or supporting structures with or without full-thickness skin loss.
Source: (EPUAP, 1998)		

APPENDIX A6: Stirling pressure ulcer severity scale

Grade	Definition
Stage 0	No clinical evidence of a pressure ulcer
0.0	Normal appearance, intact skin
0.1	Healed with scarring
0.2	Tissue damage but not assessed as a pressure ulcer
Stage 1	Discoloration of intact skin (light finger pressure applied to the site does not alter the discoloration)
1.1	Non-blanchable erythema with increased local heat
1.2	Blue/purple/black discoloration. The ulcer is at least stage 1
Stage 2	Partial-thickness skin loss or damage involving epidermis and/or dermis
2.1	Blister
2.2	Abrasion
2.3	Shallow ulcer, without undermining of adjacent tissue
2.4	Any of these with underlying blue-purple-black discoloration or induration. The ulcer is at least stage 2
Stage 3	Full-thickness skin loss involving damage or necrosis of subcutaneous tissue but not extending to underlying bone, tendon or joint capsule
3.1	Crater, without undermining of adjacent tissue
3.2	Crater, with undermining
3.3	Sinus, the full extent of which is not certain
3.4	Full-thickness skin loss but wound bed covered with necrotic tissue (hard or leathery black-brown tissue or softer yellow-cream-grey slough) which masks the true extent of tissue damage. The ulcer is at least stage 3. Until debrided it is not possible to observe whether damage exceeds into muscle or involves damage to bone or supporting structures
Stage 4	Full-thickness skin loss with extensive destruction and tissue necrosis extending to underlying bone, tendon or joint capsule
4.1	Visible exposure of bone, tendon or capsule
4.2	Sinus assessed as extending to bone, tendon or capsule
Third-digit classification —	for the nature of the wound bed
x.x0	Not applicable
x.x1	Clean, with partial epithelialization
x.x2	Clean, with or without granulation, but no obvious epithelialization
x.x3	Soft slough, cream-yellow-green in color
x.x4	Hard or leathery black-brown necrotic (dead/avascular) tissue
Fourth-digit classification for infective complications	
x xx0	No inflammation surrounding the wound bed
x.xx1	Inflammation surrounding the wound bed
x.xx2	Cellulitis bacteriologically confirmed
Source: Reid and Morison (1994)	

APPENDIX A7: Braden risk assessment scale

BRADEN SCALE FOR PREDICTING PRESSURE SORE RISK								
Patient's Name _____		Evaluator's Name _____		Date of Assessment _____				
SENSORY PERCEPTION ability to respond meaningfully to pressure-related discomfort	1. Completely Limited Unresponsive (does not moan, flinch, or grasp) to painful stimuli, due to diminished level of consciousness or sedation. OR limited ability to feel pain over most of body	2. Very Limited Responds only to painful stimuli. Cannot communicate discomfort except by moaning or restlessness. OR has a sensory impairment which limits the ability to feel pain or discomfort over 1/2 of body.	3. Slightly Limited Responds to verbal commands, but cannot always communicate discomfort or the need to be turned. OR has some sensory impairment which limits ability to feel pain or discomfort in 1 or 2 extremities.	4. No Impairment Responds to verbal commands. Has no sensory deficit which would limit ability to feel or voice pain or discomfort.				
MOISTURE degree to which skin is exposed to moisture	1. Constantly Moist Skin is kept moist almost constantly by perspiration, urine, etc. Dampness is detected every time patient is moved or turned.	2. Very Moist Skin is often, but not always moist. Linen must be changed at least once a shift.	3. Occasionally Moist: Skin is occasionally moist, requiring an extra linen change approximately once a day.	4. Rarely Moist Skin is usually dry, linen only requires changing at routine intervals.				
ACTIVITY degree of physical activity	1. Bedfast Confined to bed.	2. Chairfast Ability to walk severely limited or non-existent. Cannot bear own weight and/or must be assisted into chair or wheelchair.	3. Walks Occasionally Walks occasionally during day, but for very short distances, with or without assistance. Spends majority of each shift in bed or chair	4. Walks Frequently Walks outside room at least twice a day and inside room at least once every two hours during waking hours				
MOBILITY ability to change and control body position	1. Completely Immobile Does not make even slight changes in body or extremity position without assistance	2. Very Limited Makes occasional slight changes in body or extremity position but unable to make frequent or significant changes independently.	3. Slightly Limited Makes frequent though slight changes in body or extremity position independently.	4. No Limitation Makes major and frequent changes in position without assistance.				
NUTRITION <u>usual</u> food intake pattern	1. Very Poor Never eats a complete meal. Rarely eats more than 1/5 of any food offered. Eats 2 servings or less of protein (meat or dairy products) per day. Takes fluids poorly. Does not take a liquid dietary supplement. OR is NPO and/or maintained on clear liquids or IV's for more than 5 days.	2. Probably Inadequate Rarely eats a complete meal and generally eats only about 1/5 of any food offered. Protein intake includes only 3 servings of meat or dairy products per day. Occasionally will take a dietary supplement. OR receives less than optimum amount of liquid diet or tube feeding	3. Adequate Eats over half of most meals. Eats a total of 4 servings of protein (meat, dairy products per day. Occasionally will refuse a meal, but will usually take a supplement when offered. OR is on a tube feeding or TPN regimen which probably meets most of nutritional needs	4. Excellent Eats most of every meal. Never refuses a meal. Usually eats a total of 4 or more servings of meat and dairy products. Occasionally eats between meals. Does not require supplementation.				
FRICTION & SHEAR	1. Problem Requires moderate to maximum assistance in moving. Complete lifting without sliding against sheets is impossible. Frequently slides down in bed or chair, requiring frequent repositioning with maximum assistance. Spasticity, contractures or agitation leads to almost constant friction	2. Potential Problem Moves feebly or requires minimum assistance. During a move skin probably slides to some extent against sheets, chair, restraints or other devices. Maintains relatively good position in chair or bed most of the time but occasionally slides down.	3. No Apparent Problem Moves in bed and in chair independently and has sufficient muscle strength to lift up completely during move. Maintains good position in bed or chair.					
© Copyright Barbara Braden and Nancy Bergstrom, 1988 All rights reserved					Total Score			

Medscape

Source: Braden and Bergstrom (1987)

APPENDIX A8: Norton risk assessment scale

Norton Scale

		Physical condition	Mental condition	Activity	Mobility	Incontinent	Total score
		Good 4	Alert 4	Ambulant 4	Full 4	Not 4	
		Fair 3	Apathetic 3	Walk/help 3	Slightly limited 3	Occasional 3	
		Poor 2	confused 2	Chairbound 2	Very limited 2	Usually/urine 2	
		Very bad 1	Stupor 1	Bed 1	Immobile 1	Doubly 1	
Name	Date						

Source: Doreen Norton, Rhoda McLaren, and A.N. Exton-Smith. An Investigation of geriatric nursing problems in the hospital. London National Corporation for the Care of Old People (now the Centre for Policy on Ageing); 1962. Reprinted with permission.

APPENDIX A9: Waterlow risk assessment scale

WATERLOW PRESSURE ULCER PREVENTION/TREATMENT POLICY

RING SCORES IN TABLE, ADD TOTAL. MORE THAN 1 SCORE/CATEGORY CAN BE USED

BUILD/WEIGHT FOR HEIGHT	SKIN TYPE VISUAL RISK AREAS	SEX AGE	MALNUTRITION SCREENING TOOL (MST) (Nutrition Vol.15, No.6 1999 - Australia)	
AVERAGE BMI = 20-24.9	HEALTHY	MALE 1	A - HAS PATIENT LOST WEIGHT RECENTLY	
ABOVE AVERAGE BMI = 25-29.9	TISSUE PAPER	FEMALE 2	YES - GO TO B	
OBESE BMI ≥ 30	DRY	14 - 49 1	NO - GO TO C	
BELOW AVERAGE BMI < 20	OEDEMATOUS	50 - 64 2	UNSURE - GO TO C AND SCORE 2	
BMI = Wt(Kg)/Ht (m) ²	CLAMMY, PYREXIA	65 - 74 3	C - PATIENT EATING POORLY OR LACK OF APPETITE	
	DISCOLOURED GRADE 1	75 - 80 4	'NO' = 0; 'YES' SCORE = 1	
	BROKEN/SPOTS GRADE 2-4	81 + 5	NUTRITION SCORE If > 2: refer for nutrition assessment / intervention	
CONTINENCE		MOBILITY		
COMPLETE/CATHETERISED	FULLY	SPECIAL RISKS		
URINE INCONT.	RESTLESS/FIDGETY	TISSUE MALNUTRITION		
FAECAL INCONT.	APATHETIC	NEUROLOGICAL DEFICIT		
URINARY + FAECAL INCONTINENCE	RESTRICTED	TERMINAL CACHEXIA 8		
	BEDBOUND e.g. TRACTION	MULTIPLE ORGAN FAILURE 8		
	CHAIRBOUND e.g. WHEELCHAIR	SINGLE ORGAN FAILURE (RESP, RENAL, CARDIAC) 5		
		PERIPHERAL VASCULAR DISEASE 5		
		ANAEMIA (Hb < 8) 2		
		SMOKING 1		
SCORE		MEDICATION - CYTOTOXICS, LONG TERM/HIGH DOSE STEROIDS, ANTI-INFLAMMATORY MAX OF 4		
10+ AT RISK				
15+ HIGH RISK				
20+ VERY HIGH RISK				

Scores can be discounted after 48 hours provided patient is recovering normally

© J Waterlow 1985 Revised 2005*
Obtainable from the Nook, Stoke Road, Henlade TAUNTON TA3 5LX
* The 2005 revision incorporates the research undertaken by Queensland Health.

www.judy-waterlow.co.uk

APPENDIX B1: De Montfort University ethical approval



1st April 2009

Ahmad Tubaishat
PhD candidate
Flat B01, Room 3
Benjamin Russell Court
35 Grassmere St
Leicester, LE2 7PT

Dear Ahmad,

Re: Ethics application – Recording of pressure ulcer prevalence in the UK and Jordan (ref: 442)

I am writing regarding your application for ethical approval for a research project titled to the above project. This project has been reviewed in accordance with the Operational Procedures for De Montfort University Faculty of Health and Life Sciences Research Ethics Committee. These procedures are available from the Faculty Research and Commercial Office upon your request.

I am pleased to inform you that ethical approval has been granted by Chair's Action for your application. This will be reported at the next Faculty Research Committee, which is being held on 25th June 2009.

Should there be any amendments to the research methods or persons involved with this project you must notify the Chair of the Faculty Research Ethics Committee immediately in writing. Serious or adverse events related to the conduct of the study need to be reported immediately to your Supervisor and the Chair of this Committee. Also, The Faculty Research Ethics Committee should be notified by e-mail to HLSFRO@dmu.ac.uk when your research project has been completed.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Paul Whiting', with a horizontal line underneath.

Professor Paul Whiting
Chair
Faculty of Health and Life Sciences
Research Ethics Committee

APPENDIX B2: NHS ethical approval



National Research Ethics Service

Derbyshire Research Ethics Committee

Derwent Shared Services
3rd Floor
Laurie House
Colyer Street
Derby
DE1 1LJ

Telephone: 01332 868765
Facsimile: 01332 868930

24 September 2009

Mr Ahmed Tubaishat
PhD Candidate
De Montfort University
Faculty of Health & Life Sciences
School of Nursing & Midwifery, Charles Frears Campus
Mary Seacole Research Centre
266 London Road
Leicester LE2 1RQ

Dear Mr Tubaishat

Study Title:	Recording of pressure ulcer prevalence in the UK
REC reference number:	09/H0401/68
Protocol number:	1.2

Thank you for your letter of 08 September 2009, responding to the Committee's request for further information on the above research and submitting revised documentation.

The further information has been considered on behalf of the Committee by the Chair.

Confirmation of ethical opinion

On behalf of the Committee, I am pleased to confirm a favourable ethical opinion for the above research on the basis described in the application form, protocol and supporting documentation as revised, subject to the conditions specified below.

Ethical review of research sites

The favourable opinion applies to all NHS sites taking part in the study, subject to management permission being obtained from the NHS/HSC R&D office prior to the start of the study (see "Conditions of the favourable opinion" below).

Conditions of the favourable opinion

The favourable opinion is subject to the following conditions being met prior to the start of the study.

Management permission or approval must be obtained from each host organisation prior to the start of the study at the site concerned.

For NHS research sites only, management permission for research ("R&D approval") should be obtained from the relevant care organisation(s) in accordance with NHS research governance arrangements. Guidance on applying for NHS permission for research is available in the Integrated Research Application System or at <http://www.rdforum.nhs.uk>.

This Research Ethics Committee is an advisory committee to East Midlands Strategic Health Authority. The National Research Ethics Service (NRES) represents the NRES Directorate within the National Patient Safety Agency and Research Ethics Committees in England.

Where the only involvement of the NHS organisation is as a Participant Identification Centre, management permission for research is not required but the R&D office should be notified of the study. Guidance should be sought from the R&D office where necessary.

Sponsors are not required to notify the Committee of approvals from host organisations.

It is the responsibility of the sponsor to ensure that all the conditions are complied with before the start of the study or its initiation at a particular site (as applicable).

Approved documents

The final list of documents reviewed and approved by the Committee is as follows:

Document	Version	Date
REC application	27057/52481/1/673	27 July 2009
Investigator CV		
PhD Student CV		
Questionnaire: Survey Questionnaire	2.0	27 July 2009
Interview Schedules/Topic Guides	1.1	27 July 2009
Letter from Sponsor		29 July 2009
Summary/Synopsis	2.1	27 July 2009
Covering Letter		27 July 2009
Protocol	1.2	27 July 2009
Participant Information Sheet	1.2	10 September 2009
Participant Consent Form	1.6	
Letter of invitation to participant	1.4	10 September 2009
Response to Request for Further Information		08 September 2009

Statement of compliance

The Committee is constituted in accordance with the Governance Arrangements for Research Ethics Committees (July 2001) and complies fully with the Standard Operating Procedures for Research Ethics Committees in the UK.

After ethical review

Now that you have completed the application process please visit the National Research Ethics Service website > After Review

You are invited to give your view of the service that you have received from the National Research Ethics Service and the application procedure. If you wish to make your views known please use the feedback form available on the website.

The attached document "*After ethical review – guidance for researchers*" gives detailed guidance on reporting requirements for studies with a favourable opinion, including:

- Notifying substantial amendments
- Adding new sites and investigators
- Progress and safety reports
- Notifying the end of the study

The NRES website also provides guidance on these topics, which is updated in the light of changes in reporting requirements or procedures.

We would also like to inform you that we consult regularly with stakeholders to improve our service. If you would like to join our Reference Group please email referencegroup@nres.npsa.nhs.uk.

09/H0401/68

Please quote this number on all correspondence

Yours sincerely



Mr Phil Hopkinson
Chair

Email: jenny.hancock@derwentsharedservices.nhs.uk

Enclosures: "After ethical review – guidance for researchers" SL-AR2

Copy to: *Prof. Denis Anthony, De Montfort University*

APPENDIX B3: Ethical approval for the Jordanian university hospital- KAUH



General Director Office

مكتب المدير العام

ص. ب. (٦٣٠٠٠١) إربد (٢٢١١٠) الأردن

هاتف: ٧٢٠٠٦٠٠ (٩٦٢ - ٢) فاكس: ٧٠٩٥٧٧٧ (٩٦٢ - ٢)

Ref. 13/3/3357

Date 11-10-2009

الرقم: _____

التاريخ: _____

الموافق: _____

Professor Paul Whiting,
Faculty of Health and Life Sciences Ethics Committee
Professor Vivien Lowndes,
Pro Vice Chncellor Research and External In come Generation
DE MONTFORT UNIVERSITY
The gateway, Leicester LE1 9BH

Dear Mr's

Referring to your letter, in which you confirm that DE MONTFORT University is undertaking the responsibilities of sponsor to the project entitled " **Recording of pressure ulcer prevalence in the UK and Jordan** ".

We would like to inform you that we accept Mr. **Ahmad Khalaf Mohammad Tubaishat** to conduct his proposal here in our hospital for the purpose mentioned above, under the following conditions:

1. Confidentiality is required while collecting data.
2. Informed consent is required to be kept in the medical record.
3. Provide us with a semi annual & final report including patient's names.
4. Provide us with the final results of the research before publishing.


Sincerely,,,

Prof. Mahmoud Al-Sheyyab

Acting CEO, KAUH
Vice President, JUST



APPENDIX B4: Ethical approval for the Jordanian general hospital- Ministry of Health

 **ZAHİ USSALEH Translation Center**
Trade Registration № : (174299) date: 17/10/2006 central registration directorate - Ministry of Industry & Trade.
Licensed by the Department of Press and Publications under №: (mn/34/4900) date: 5/11/2006, in accordance with
Prime Minister's decree № : (7/11/14987) date: 30/10/2006.

By the name of God
Official motto
The Hashemite Kingdom of Jordan
Ministry of Health

Ref №: develop/training /7052
Date: 15/10/2009

Princess Basma Teaching Hospital Director
Director of Al Bashir Hospital
Prince Hamzah Hospital Director

Best greeting

Enclose herewith a letter from the Chairman of the Ethics committee of Scientific Research No. m b 1/ Ethics committee on 13/10/2009 , regarding the approval to allow a PhD student: Ahmad Khalaf Mohammad Tubaishat doing a research paper entitled:-

(Recording of pressure ulcer prevalence in Jordan)


Through the examination of patients residing in the esoteric inner sections at Princess Basma Teaching Hospital, Al Bashir Hospital and Prince Hamzah Hospital and access to their files.

Please kindly consider the request and instruct those who needed to facilitate the task of a researcher mentioned in the above search.

Best regards

Director of Human Resources Development
Dr. Ayoub AlSayaydeh
Director of Human Resources Development
Dr. Mohammad Shhadah AlKhayat

Seal & Signature


Zeki Ussaleh
18/10/2009

Copy to/ the file



Jabal Al-Hussein – 199 Albwab building, first floor. Khalid bin Alwaleid St. - Opp.HSBC bank, P.OBox: 420545 Amman 11142 Jordan. Cell +962 7 77600285. Tel: 00 962 6 5683361 Fax: 00 962 6 5683362
E-mail: zahi_translation@yahoo.com

Appendix B5: Information sheet for participants of the study one (UK)

Research title: Recording and Utilising Pressure Ulcer Data in Clinical Settings

Researcher: *Ahmad Tubaishat*

Participant Information Sheet (PIS)

This is research study to survey UK healthcare organisations and you are invited to determine how clinicians recorded and used pressure ulcer data. The pressure ulcer data is any data related to pressure ulcer, like; risk assessment scale, grading system, prevalence of pressure ulcer, frequency of pressure ulcer audit, etc. Recorded mean either on paper or electronic record system. Used mean what you are use/ make of this collected data, e.g.: generate regular reports, feedback, etc.

What is the purpose of the study?

This study is conducted as part of PhD thesis. The main purpose of this study is to determine how pressure ulcer data are recorded and used in clinical practice as illustrated above.

Why have I been invited to take part?

You are invited to take part of this study because you are a tissue viability nurse and you are the only person who has such data in your files.

Do I have to take part?

The participation in this study is completely voluntary, only you who can decide to participate or not. If you decide to do so, you can withdraw at any stage of the study without penalties. Regardless of whether you choose to participate or not, please let me know if you would like a summary of the findings. To receive a summary, please E-mail me at: ahmad.tubaishat@learner.dmu.ac.uk, also if you have any questions or concerns about completing the questionnaire or about being in this study, you may contact me at the same E-mail.

What will I have to do if I take part?

The study contains two major phases; the first one is questionnaire. It is asks simple and direct questions related to pressure ulcer data. Most of the questions are multiple choice questions, and some of them need one or two words answer, it takes less than five minutes to complete. The questionnaire is available online through a hyperlink provided in the invitation letter that links you to the questionnaire directly. Filling the questionnaire in and submit it will be taken as evidence of consent. If you prefer the paper format, paper version of the survey will be sent by post to you with prepaid envelop just to fill and resend it.

The second phase of this study is conducting the interview; the final question in the questionnaire asks if you are willing to be interviewed to contact the researcher on the provided address, or to leave your email to be contacted. The interview will be a semi-structured one, with some questions, asking how pressure ulcer data recorded and how it can be used. It is designed to gain more in-depth information about the topic. The interview will be face to face or telephone interview, last from 15-30 minutes and can be conducted in the work place, at any convenient time and way.

What are the disadvantages or risks of taking part?

There are no risks to you or to your privacy if you decide to join the study by filling in the questionnaire. Your responses will not be identified with you personally, and not to share any information that identifies you with anyone outside the research group which consists of the researcher and his academic supervisor. You are not asked to put your name nor your organizations' name on the questionnaire.

What are the possible benefits of taking part?

Through your participation I hope to understand how pressure ulcer data are recorded and used in the UK. The results of will inform clinicians on best practice for auditing pressure ulcers.

Will my taking part be kept confidential?

Your participation will be confidential; no one outside the research team (the student and his academic supervisor) will have access to your personal data. But, you should know that some relevant sections of the data collected during the study may be looked at by individuals from regulatory authorities or from De Montfort University, where it is relevant to taking part in this research. This is ensured in the consent form date 10/9/2009 version 1.6.

Who should I contact if I have a concern about the study?

If there is any concern please do not hesitate to contact the researcher, his academic supervisor or the sponsored university. Details of those presented at the end of this sheet.

What will happen to the results of the study?

The results of this study will be a section of the results chapter of the PhD thesis. It might be possible to share the results by publishing them in a scientific journal and/or presenting them in national or international conferences relevant to tissue viability.

Who is organising and funding the study?

This study is a part to fulfil a requirement of PhD thesis at De Montfort University. So, the research completely organised and funded by De Montfort University.

Who has reviewed the study?

All research in the NHS is looked at by an independent group of people, called a Research Ethics Committee, to protect your interests. This study has been reviewed and given favorable opinion by Derbyshire Research Ethics Committee.

Contact details*The researcher:*

Ahmad Tubaishat/ PhD candidate
De Montfort University
Faculty of Health & Life Sciences
School of Nursing & Midwifery, Charles Frears Campus
Mary Seacole Research Centre
266 London Road
Leicester LE2 1RQ
United Kingdom
E-mail: ahmad.tubaishat@learner.dmu.ac.uk
atubaishat@yahoo.com
Mobile: 0759-3581-726

The academic supervisor:

Professor Denis Anthony
De Montfort University
Faculty of Health & Life Sciences
School of Nursing & Midwifery, Charles Frears Campus
Mary Seacole Research Centre
266 London Road
Leicester LE2 1RQ
United Kingdom
E-mail: danthony@dmu.ac.uk

The sponsored university:

De Montfort University
Faculty of Health & Life Sciences
The gateway
LE2 9BH
Leicester
Leicestershire, UK

Appendix B6: Letter of invitation to participants of the study one (UK)

Research title: Recording and Utilising Pressure Ulcer Data in Clinical Settings
Researcher: Ahmad Tubaishat

Invitation Letter

Dear Respondent,

I am inviting you to participate in my research study which aims to survey UK healthcare organisations to determine how pressure ulcer data is recorded and used. The hyperlink below takes you directly to a short questionnaire which asks questions about pressure ulcer data recording. The questionnaire is available online at:

<http://www.surveymzmo.com/s/129734/pressure-ulcer>

If you would prefer to complete the questionnaire in paper format, I can send you a paper copy in the post (my contact details are below). The survey has only a small number of questions and should take about 5-10 minutes to complete. More information is available in the attached participants' information sheet.

Through your participation I hope to understand how pressure ulcer data are recorded and used in the UK. The results of the survey will inform clinicians on best practice for auditing pressure ulcers and I will share my results with you by publishing them in a scientific journal and/or presenting them in national or international conferences relevant to tissue viability. In fact, this research is being conducted to obtain an academic qualification (PhD in nursing).

The survey is anonymous and therefore I do not ask for your name or the name of your organisation. I would, however, also like to interview some clinicians in an effort to seek more detailed information on pressure ulcer data recording. If you are willing to be contacted to arrange a telephone or face to face interview please get in touch with me (full contact details are below), or simply leave your email address in the allocated space in the questionnaire.

My contact details:

De Montfort University
 Faculty of Health & Life Sciences
 School of Nursing & Midwifery, Charles Frears Campus
 Mary Seacole Research Centre
 266 London Road
 Leicester LE2 1RQ
 United Kingdom
 E-mail: ahmad.tubaishat@learner.dmu.ac.uk
 atubaishat@yahoo.com
 Mobile: 0759-3581-726

Appendix B7: Consent form for the interviewees of the study one (UK)

Research title: Recording and Utilising Pressure Ulcer Data in Clinical Settings
Researcher: Ahmad Tubaishat

INTERVIEW CONSENT FORM

Please initial box

1. I confirm that I have read and understand the information sheet dated 10/9/2009 (version 1.2) for the above study. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐
2. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason, without my legal rights being affected. ☐
3. I understand that I have the right to decline to answer any question that I am asked. ☐
4. I understand that relevant sections of the data collected during the study may be looked at by individuals from regulatory authorities or from De Montfort University, where it is relevant to my taking part in this research. I give permission for these individuals to have access to my study data in order to monitor the research. ☐
5. I agree to take part in the interview for the above study. ☐

 Name of Participant

 Date

 Signature

 Name of Researcher

 Date

 Signature

When completed: 1 for participant; 1 for researcher file

Appendix B8: Information sheet for participants of the study two (Jordan)

Research title: Recording and Utilising Pressure Ulcer Data in Clinical Settings
Researcher: *Ahmad Tubaishat*

Patients Information Sheet- Jordan Part

You are being invited to take part in a research study. Before you decide it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and discuss it with others if you wish. Ask the researcher if there is anything that is not clear or if you would like more information. Take time to decide whether you wish to take part. Thank you for reading this.

This study is part of the major study that conducted in the UK, which aims to explore how PU data are recorded and used in practice. The Jordanian part concerning the prevalence rate of pressure ulcer and compare it with international rates. All the patients in this hospital will be examined for the presence of pressure ulcer by the researcher. The assessment (which is type of skin assessments; and looking for redness or sores in any area in the body, especially in the most common area like: sacrum, heel, hip, back of the head, and other areas), it will take place in the patient bed and take less than 10 minute to complete it, after that the medical record for those patients whom examined will reviewed by the researcher to collect some supportive data (of course, after gaining the ethical approval from the hospital and your signed consent form).

It is up to you to decide whether to take part or not. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a consent form (you have 1 day to decide). If you decide to take part, you are still free to withdraw at any time and without giving a reason. A decision to withdraw at any time, or a decision not to take part, will not affect the standard of care you receive.

Your data will not be shared with anyone except with your consent or as required by law. All personal information such as your name will be removed from the data and will be replaced with a number. A list linking the number with your name will be kept in a secure place, separate from your file. If the results of the study are published, your name will not be used and no information that discloses your identity will be released or published without your specific consent to the disclosure.

There is no known risk for this study, also we cannot promise any personal benefits to you from your participation in this study, the information we get from this study will help us in better understanding of this problem.

This study is being organized by the school of nursing at De Montfort University in UK, and the research ethics committee their approves this study.

The result of this study will be available with the researcher after finishing it, any participant can call or E-mail the researcher for a copy of the result, also if you have any questions about the research now or later, or you have any questions regarding your rights as a research participant, please contact me on:

Ahmad Tubaishat
De Montfort University
Faculty of Health & Life Sciences
School of Nursing & Midwifery, Charles Frears Campus
Mary Seacole Research Centre
266 London Road
Leicester LE2 1RQ
United Kingdom
UK Tel: 00447593581726
Jordan Tel: 00962777325165
E-mail: atubaishat@yahoo.com
ahmad.tubaishat@learner.dmu.ac.uk

Thank you for considering taking part in this research. The researcher will contact you in a few days. You can ask any questions you have and let him know whether you would like to take part or not.

تسجيل نسبة حدوث القروح الضغطية في بريطانيا والاردن

احمد طبيشات
جامعة ديمونت فورت
كلية العلوم الصحية والحياتية
قسم التمريض

ورقة معلومات خاصة بالمرضى

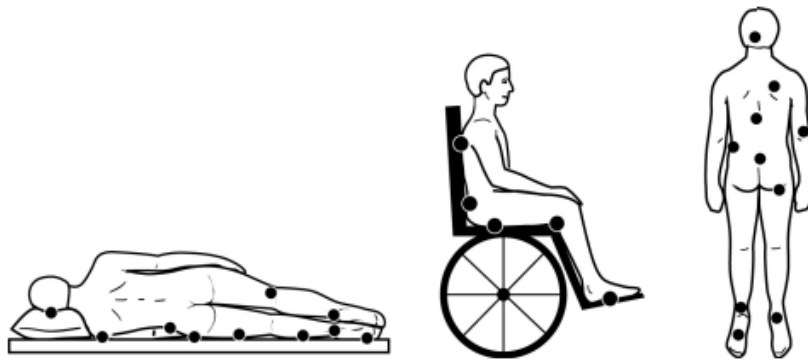
عزيزي المشارك / عزيزتي المشاركة

انني ادعوكم للمشاركة في هذه الدراسة بشأن القروح الضغطية التي من الممكن ان تكونوا قد اصبتم بها.

ان المشاركة في هذه الدراسة هو اختياري وتطوعي تماما ، اذا قررت المشاركة في هذه الدراسة التي من شأنها تحديدي حجم المشكلة في الاردن للوقوف على الاسباب المؤدية لها وكيفية الوقاية او العلاج منها، فالمعلومات التالية مفيدة لكم

ماهي القروح الضغطية

القروح الضغطية (وتعرف ايضا بالعقر او قروح الفراش) تصيب الاشخاص كبار اسن والعاجزين عن الحركة والمرضى في الفراش، تصيب عادة الجلد في اماكن فوق العظم – خاصة عند الكاحل والارداق واصابع الرجلين.



الصورة توضح الاماكن الاكثر عرضة للاصابة

ماهو سبب هذه الدراسة

هذه الدراسة تجرى من اجل تحديد حجم مشكلة القروح الضغطية في الاردن حيث ان هذه المعلومات غير متوفرة لذلك، وعند تحديد حجم هذه المشكلة بدقة فانه بالامكان اعطاء توصيات لاصحاب القرار من اجل رسم سياسات واضحة للحد من هذه المشكلة والتخفيف من حالات ظهورها علما بانها يمكن منعها بشكل كبير جدا. بالاضافة الى ان تكلفة علاج هذه المشكلة باهظه جدا.

ماذا تتضمن هذه الدراسة:

سوف تستغرق هذه الدراسة من 5-10 دقائق من وقتكم، واذا وافقتم على المشاركة في هذه الدراسة:

- 1- سوف يطلب منكم الباحث بالسماح له بمعاينة جلدكم لمعرفة ما اذا كان هنالك احمرار او تشقق في الجلد. وخصوصا في الاماكن الاكثر عرضة كما هو موضح في الصورة السابقة.
- 2- سوف يطلب منكم الباحث بالسماح له بالاطلاع على ملفكم الطبي لمعرفة ما اذا كان هناك ذكر للقروح الضغطية فيه، لن يتم نقل ملفكم الطبي من المكان.

مالذي سيحدث للمعلومات

سوف يتم جمع المعلومات التي التي يحصل عليها منكم ومن بقية المرضى ويصار استخدامها من اجل تكوين فكرة عن حجم المشكلة وسيتم تزويد مستشفاكم بذلك، حتى يتم التعامل بشكل فاعل مع الحالات التي فيها احتمال نشوء قروح ضغطية.

سوف تساعد هذه المعلومات ايضا على تحديد مخاطر نشوء الاصابة بقروح الضغط بالضبط ، وماهي الاشياء الاساسية التي يجب عى النظام الصحي والكادر الطبي وبخاصة التمريض ان يعملوها من اجل التخفيف من هذه المشكلة.

سوف تستخدم معلوماتكم الشخصية فقط للمساعدة بتحليل المعلومات. سيتم ازالة بياناتكم الشخصية قبل اصدار اي تقرير وسوف يتم اتلافها فور الانتهاء من الدراسة.

هل ستترتب اي مخاطر من المشاركة في هذه الدراسة

- ان مشاركتكم في هذه الدراسة لن تتدخل باي شكل من الاشكال في علاجكم.
- ان مشاركتكم اختيارية طوعية كليا ولكم حرية تغيير رأيكم في اي وقت تشاؤون.
- تعتبر خصوصياتكم وسرياتكم على راس اولويات الباحث.
- لن يتم الاحتفاظ باي معلومات من شأنها ان تشير الى هوياتكم.

المزيد من المعلومات

للحصول على اي معلومات اضافية ارجو سؤال الباحث في الايام المحددة للدراسة عن اي شئ قد يكون غير واضح، واطلبوا منه ان يشرح لكم بشل موسع.

شكرا على وقتكم وعلى اخذكم هذا الطلب بعين الاعتبار

Appendix B9: Consent form for the participants of the study two (Jordan)

Research title: Recording and Utilising Pressure Ulcer Data in Clinical Settings
Researcher: Ahmad Tubaishat

Participant Consent Form

Hospital Code: []
Patient Identification Number for study: []

The participant should complete the whole of this sheet himself/herself. Please tick to confirm:

I have been given written and verbal information regarding the aims of the research and it is explained to my satisfaction. ☐

I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily. ☐

I understand that my participation is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. ☐

I understand that the researcher will hold all information and data collected securely and in confidence and that all efforts will be made to ensure that I cannot be identified as a participant in the study, and I give permission for the researchers to hold relevant personal data ☐

I agree to take part in the above research study ☐

<i>Name of participant</i>	<i>Signature</i>	<i>Date</i>
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<i>Name of researcher</i>	<i>Signature</i>	<i>Date</i>
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When completed, one copy for the patient; one copy for the researcher file.

نموذج تفويض للمشاركة في بحث

تسجيل نسبة حدوث القروح الضغطية في بريطانيا والاردن، احمد طبيشات

عزيزي المشارك/ عزيزتي المشاركة هذا عبارة عن بحث لتحديد حجم مشكلة قروح الصعوط في الأردن، ولمعرفة المزيد من المعلومات حول طبيعة البحث وأهدافه والمنافع والمخاطر من هذا البحث أرجو قراءة ورقة المعلومات الخاصة بالمرضى المرفقة، علما بان هذا البحث حاز على موافقة إدارة المستشفى والجهات المعنية للقيام به داخل هذه المستشفى. أرجو قراءة البنود التالية بدقة، ووضع إشارة (√) امام كل عبارة:

- ☐ لقد تم شرح اهداف البحث بشكل واضح وتم تقديم الشروحات الشفوية والكتابية لذلك
- ☐ لقد اعطيت الفرصة الكاملة لان اسال اي سؤال وان تجاب عن اسئلتي كاملة
- ☐ لقد تم التاكيد بان مشاركتي في البحث اختيارية وانني استطيع الانسحاب
باي لحظة دون تقديم اسباب او ان تتاثر نوعية العناية الطبية المقدمة الي
- ☐ لقد تم التاكيد بان الباحث فقط لديه الحق بالاطلاع على المعلومات التي
جمعت مني سواء من خلال الفحص السريري او من خلال ملفي الطبي،
وان كل الجهود ستبذل من اجل المحافظة على خصوصيتي وسرية المعلومات
- ☐ بناءا على ما سبق فأنتى أوافق على المشاركة بالبحث المشار اليه

في حال وجود شكوى من قبل المرضى المشاركين بالبحث يمكن الاتصال على منسقة اللجان الدائمة على الرقم المباشر 7200610 أو فرعى (45011).

اسم المشارك	توقيعه	التاريخ
اسم الباحث	توقيعه	التاريخ

تحفظ نسخة للمريض ونسخة في ملفه ونسخة في ملف الباحث

Appendix C1: Questionnaire

Research title: Recording and Utilising Pressure Ulcer Data in Clinical Settings
Researcher: Ahmad Tubaishat

Questionnaire

The following is a questionnaire which deals with pressure ulcer data recorded in the UK. This is one part of my doctoral study, which aims to determine how PU data are recorded and used in different care settings. Completing the survey should take 5-10 minutes. Thank you.

* Please specify if this information provided at the organisational or ward level.

1- Type of Organisation:

- ☐ Hospital
☐ Primary Care Trust
☐ Health Centre
☐ Nursing home
☐ Other, please specify: -----

2- The total number of beds (if hospital) or patients/clients:

3- What is the approximate prevalence rate (%) of pressure ulcer in your organization? (Please specify if this percentage is at organisational or ward level) -----

4- And / or what is the total number of pressure ulcer patients when last recorded? (Please specify if this is an organisation or ward based number): -----

5- Are the numbers given in both Q3 and Q4 based on:

- ☐ Prevalence survey
☐ Clinical audit
☐ Routine paper based reports
☐ Electronic patient record
☐ Other, please specify: -----

6- What is the frequency of carrying out pressure ulcer audits in your organisation (e.g. monthly, quarterly, annually, etc., and please specify if these audits are carried out at organisational or ward level):

7- The person responsible for pressure ulcers auditing in your organisation is:

- ☐ Tissue Viability Nurse (TVN)
- ☐ Wound care nurse (e.g. link nurse)
- ☐ Senior nurse manager
- ☐ Clinical ward nurse
- ☐ Other, please specify: -----

8- What risk assessment scale is used in your organisation:

- ☐ Waterlow
- ☐ Braden
- ☐ Norton
- ☐ Other, please specify:-----
- ☐ Don't use risk assessment scales
- ☐ I don't know

9- What grading system is used:

- ☐ European Pressure Ulcer Advisory Panel (EPUAP)
- ☐ National Pressure Ulcer Advisory Panel (NPUAP)
- ☐ Stirling
- ☐ Torrance
- ☐ Other, please specify: -----
- ☐ Don't use grading scale
- ☐ I don't know

10- What the type of records are used to record pressure ulcer data in your organisation:

- ☐ Electronic Health Records
- ☐ Paper Health Records
- ☐ Combination of both

* I am inviting clinicians involved in treating pressure ulcers to be interviewed (by telephone or face to face). If you are willing to be interviewed I should be pleased to hear from you. My contact details are:

Ahmad Tubaishat

**Mary Seacole Research Centre, School of Nursing & Midwifery, De Montfort University
Charles Frears Campus, 266 London Road, Leicester LE2 1RQ, United Kingdom.**

E-mail: ahmad.tubaishat@learner.dmu.ac.uk

atubaishat@yahoo.com

Mobile: 0759-3581-726

Or, you can simply provide your email, to be contacted by the researcher to arrange for the interview:

Thank you for taking part in this study

Appendix C2: The Interview Schedule content

The interviews started with a general introduction about the study then moved on to the schedule (Appendix), which included six sections. The content of the interview schedule was as follows:

Section one: Types of PU data

This was an introductory section, which clarified which types of PU data are usually collected and recorded by the TVNs and the nurses.

Section two: Recording of PU data

This section explored how PU data is recorded, either on paper or by use of electronic records, and whether there are differences in methods of recording PU data in different care settings.

Section three: Reporting and referring of PU cases

This section discussed how the nurses, either in hospital wards or in community settings, report a PU case when it occurs or is admitted and when the cases are referred to a TVN for advance and professional help.

Section four: PU audit

This section intended to discover how PU audits, including prevalence audits, are conducted. It also aimed to identify whether there are any differences in the way in which these audits are conducted in different settings.

Section five: Use of PU data

The aim of this section was to identify the uses of the collected PU data in different settings.

Section six: Advantages and disadvantages of recording systems

This section explored the advantages and disadvantages of each type of PU data recording system.

Finally, all the interviews were concluded by asking the interviewees whether they had any extra information they would like to mention. This authorized interviewees to freely convey any concerns and to add anything which may have been missing from the interview until that point.

Appendix C2: The Interview Schedule

Research Title: Recording and Utilising Pressure Ulcer Data in Clinical Settings
Researcher: Ahmad Tubaishat

Semi-structured Interview

Code of interviewee:

Type of interview:

☐ Face to face

☐ Telephone

Q1- How does your organisation record PU data (like: prevalence, incidence, risk assessment, grading, prevention, etc)?

Q2- Who documents / records PU data? What do they/ you document?

Q3- What you are use/ make of this recorded data? Is there any collected data not used?

Q4- How do the nurses report the occurrence / admission of PU cases? (Paper, electronic reporting?) Is it done in real time?

- **If you use paper reporting, how do you receive information from wards? At what frequency?**

- **If it is electronic reporting, do you think it is helpful to have such a system?**

Q5- Is there a referral form / policy / procedure for referral to the TVN? What is the protocol for referral?

Q6- What are the advantages and disadvantages of the system that you use in your organisation? Do you think there will be differences between paper and electronic systems in recording PU data?

Appendix C3: Interviews' field notes (Interviewees 1-16)

Interviewee 1: TVN specialist, primary setting, paper system of recording PU data

PU data recording:

They record on paper system; everything is on the paper system. The nurses and the TVN record on paper system. The nurses inspect the skin of the patients entered into community setting. If ulcer found, they grade them, record that on the nursing notes. If the ulcer is G2> they fill form send it to TVN as a clinical incident on monthly basis. On this form complete assessment for the patient done. The TVN collate the forms together to see the incidence in each setting and in the whole trust.

PU data reporting:

The nurses report all grade 2 and above cases in the special form sent to TVN. Paper reporting, no e-reporting.

There is a problem of underreporting.

PU referring:

There is form to refer to TVN. But, the protocol of referring is very vague (loose criteria), usually when the:

- PU > 8 weeks, not heal
- Deteriorated wounds
- Deep ulcer, grade 3 and 4

How audit conducted:

She stops doing prevalence reports; because she thinks it is useless. Regarding the incidence she don't do it usually, because this is a community service, the patients seen in their homes or in the clinic for short time, assessed and dressed, so it is difficult to calculate the incidence rate.

PU data using:

The data collected not useful. She said "Absolutely Nothing, the data collected has no value". That because the quality of the data is poor, because it depend on the reliability of the nurses to report PU data, and most of the time the nurses underreport cases, or they may grade PU inaccurately. Moreover, she thinks this data is useless because she is unable to allocate the equipments which make the data less useful.

Pros and cons of recording system:

She think no difference between the two systems in term of accuracy or anything, because the quality of data depend in the first place on the reliability of nurse, his willingness to report, and to report correctly, on time, his grading, etc. most of the time nurses under grade PU, so even if we apply the E-system, the person who enter the data on that system, if he grade wrongly he will enter the wrong data on either paper or E-system, no difference at all.

It can be OK, if they implement a clever system, for both the nursing note and reporting system, that have a mandatory filling of the field that obligate the nurse to make full assessment of PU, which may enhance the quality of recorded data (in paper, there is some missing of the data), but the system has disadvantages.

Disadvantages for E-system as she think:

The nurse especially in the community field are older, who are computer illiterate, not competent, terrified, not comfortable, no confidence, fear of losing the data to deal with such system. In order to implement and be skilful in such system, you should spend much of time on it, and this is difficult in the clinical settings, because most of the time is directed to patients care. Moreover, there is no infrastructure and no access for the nurses.

Paper system

Advantages: The only advantage that she can see in the paper system is the flexibility of the documentation, you are not follow a rigid electronic format where you are instructed to follow these format, in paper you write anywhere then you can back later to add another data, etc.

But, in the Paper system: there is some missing in the data, it is not complete, and illegible handwritten.

Interviewee 2: TVN specialist, primary setting, combination system of recording PU data

PU data recording

All patient discovered or entered to the community settings have an ulcer *grade 2 and above* recorded as clinical incident. There are different ways of recording depending on the setting; they are using a mixed system of recording PU data:

- DN: see patients in clinics or in their homes. If patient found to have an ulcer, the DN fill digital online form (using Datix system) stating *all the details* of the patient and his ulcer. This report go immediately to TV office and a report can be generated immediately, the feature of this system enable the nurses and the TVN to have a self generating report for each PU case, but the problem if you need a general report that include all the cases, then you need to collate all these data manually and generate a general report.
- Nursing homes and community hospitals: the staff record all PU data on paper system, they send monthly paper report to the TVN where again she can collate the data.

PU data reporting:

DN report through the online system, while the nurses in both the nursing homes and community hospital fill a specific form and send it to TVN.

In the DN case (E-reporting), the nurses can report case immediately, so she can know the PU cases immediately and she can provide her help. While in the community hospital and nursing home (paper reporting) she knows on monthly basis of the cases, unless there is a complicated case need her help.

PU refereeing:

No forms. Policy: when there is a complicated case that the standard care not works, they refer the case to TVN. When they need a suggested case plan, or when they need equipment such as the negative pressure.

How audit procedure:

- In nursing home and community hospitals: she *send an audit form annually* on the designated day to them, the staff nurse there fill this form, stating the number of PU cases, send it back to her where she collate all these data together and produce report.
- DN: because they are using digital online form, they record and report any cases discovered immediately into the system and as it emerged. This enables them to generate reports immediately, and enable the TVN to generate reports also. From this number of PU patient provided, the prevalence can be calculated into two ways.
 - The first is to know the prevalence in the DN caseload by dividing the total number of patients she sees them with PU over the total number of patients registered in her caseload and she sees them, this can give a large prevalence.
 - The second way is dividing the same number of PU patients over the total number of population of the PCT. This done when they want to know the prevalence rate in the community that covered by this PCT, which may give small prevalence due to including much health people from the community.

PU data using:

The data are useful as perceived from this TVN. They can collate data and generate report to the trust level; in this report the number of PU cases in each setting can be known. They can use the data also as a way to decide the need for purchasing of equipments.

Pros and cons of recording system:

Advantage: the only advantage that she sees is the electronic reporting of the cases, where she can know in real time situation about PU case; also it is type of recording and documenting this data, especially the clinical incident. This build a database that used to generate reports.

Disadvantages: the problem of the online system that used by the TVN and the DN is that this system is not designed for PU ulcer specifically, it is for any clinical incident reporting. So this make it difficult to deal with because it is complicated, not specific, take long time, slow, cannot do a general report, because the forms are not collated, she should do it manually.

Only the clinical incident can recorded in this system, used to report PU case, but other information cannot be entered into this system like; prevention provided, care plans, patient history, etc.

She not prefer paper system, but she suggest to change this system to one more specific for PU cases, more easier and quicker that this one, because dealing with an online system will be more better, quicker, easier, simpler than the paper system and the one that they are using at the meantime.

Paper system: she not prefer paper system, it is difficult to collate all the paper forms from all settings together since there are many setting refer to this trust, it is a complicated process that consume a lot of time.

Interviewee 3: TVN specialist, primary setting, electronic system of recording PU data

PU data recording:

The nurses record all PU data on an electronic system. All patient discovered or entered to the community settings have an ulcer recorded on the system. This electronic system is a central system, where the TVN can view all PU cases on a regular basis in all different setting. All different setting; DN, community hospitals, and nursing homes can record into this system.

PU data reporting:

By using the system, the TV office can know that there is a PU case in that setting at the real time situation, because it is reported electronically into a central system. The nurses report all PU cases via the system to TVN.

PU referring:

No specific form.

The protocol: the TVN can automatically review the system and follow up the non-healed grade 3 and 4.

How audit conducted:

The TVN send an audit form to the nurses to fill in a specific day in the year. The nurses fills the form with the number of PU patient in their settings. Return the form back to the TVN. Then she can collate these forms and produce a prevalence report. They can use the system to generate incidence report over a period of time.

PU data using:

She found that the data collected is useful. They can generate reports to know exactly the numbers of PU cases in their trust, and in all settings.

Pros and cons of recording system:

Advantage: the TVN can know at the time of reporting about PU cases in any setting. So, through this system she can track PU cases, ensure that better care plans provided by the nurses, because that everything is recorded on the system. She thinks that this e-system is much easier and quicker than a paper system.

Interviewee 4: TVN specialist, primary setting, combination system of recording PU data

PU data recording

When PU patient admitted to a community setting, the nurses there (DN, nurses in the community hospitals), - the nurses in the nursing home have there own reporting system- should record and report that to the TV office (in the trust) by filling specific form and fax this form and ring the TV office on monthly basis. In this form; how many PU patient seen, their care plans, and complete assessment. The TVN record these data into e-system available for TV office only. So, they are using a combination system for recording PU data.

They can also ask the patient, if he have incident report from hospitals to know if this ulcer is hospital acquired or develop from the community, from his data the last year, around 50% of the patient. reported are from the hospitals.

PU data reporting:

The nurses use this form to report PU cases to TVN. There are using paper forms, no E-reporting. This TVN complain from the underreporting problem. The nurses not report all these cases (blame culture), they report and refer only the advance complicated biggest and worst cases for advice, and only when need help. He do not trust their reporting because most of the time nurses not reported because we live in blame culture, and even if reported, only the sever cases reported (grade 4), which is again make it difficult to calculate the prevalence. For example; the last reporting was 46 PU patients in whole trust population which is unbelievable. If they still underreport cases they will have neglected patient, because no one will know about the patients and they will not receive the professional care. This may lead to safeguarding procedure and require further investigations.

PU data referring:

No form.

The protocol is: The nurse only refer the worst cases and only when they need the help (grade 4), otherwise they can do the job alone (they are trained on TV by TVNs)

How audit conducted

In this case the audit about Prevalence and incidence not conducted. He think the two type of prevalence rate are inaccurate; either the entire community rate or the DN caseload rate, the first one due to large number of healthy people in the trust population, and the second because many patients not registered in the DN caseload. In addition to the problem of underreporting that he complains from it.

This TVN work for 5 years in the primary care settings. Now working in a PCT that cover many aspects of primary care: health centres, nursing homes, care homes, patient own homes, DN caseloads, community hospitals. They cover a population of around 600000 people. This makes it difficult to calculate prevalence and incidence in this large population. (For these reason calculating prevalence in the community settings is very difficult), because they are many health people in the community).

This TVN think that the prevalence rate that calculated in the DN caseload is inaccurate as well. Usually, the DN see the patients in the health centres if they are mobile and can come, if not, they visit them in their home and do follow-up. DN is the nurse responsible for PU patients and the related data in the community settings. They can calculate prevalence by dividing the number of PU patient over the total number in the caseload, but this not accurate, because some patients may not go to health centre, and receive the care in their homes from family.

PU data using:

Prevalence data not collected, data are under reported this two reason make the data is not useful. They collect data about number of PU patients and their characteristics. They do not have prevalence and incidence data, because they do not collect this type of data, what they have is a record of the patients, who have ulcers and related information. Which will be presented in annual report at trust level. This TVN believe that the data (reports) will be useful if the problem of underreporting is overcome. They can benefit from this reports that show the number of PU patients and their characteristics by increasing the care provided to the patient especially if they are notice that the number of PU patients increased further and further.

Moreover, this data that collected about the PU patients, enable them to have a record for PU patient, then the TVN can follow that up), also this data can be used to ask for advice regarding their patients (since that TVN is more professional in that).

Pros and cons of recording system:

He has a simple E-system that available to TV department, this is not the full version of the system, they will upgrade to the full version within the next 8 months. When upgrading to the full version he think this will improve the reporting because it will be on the fingertips, avoid filling the long paper forms. When there is E-system across such huge trust he can know exact number of PU patients by linking all the settings in the system, and this will deliver inform to him directly. He can know how many ulcers present, care Plans, how nurses provide the care, nurses can attach ulcer pictures to him to ask for help, patient history, number of PU patient in each setting, the number of population of each setting and the number of people that visit that setting.

Moreover, the new system, will linked to other hospital system, which mean he can know the lap test, medication, nursing documentation, etc.

He think the application of the full electronic system in community settings could improve care: by knowing the cases, count the number of ulcer cases, this will be used to convince the director that more nurses needed in specific area or to provide special training or audit in the area with higher PU cases which then can lead to improve care.

But again that depend basically on the nurse to report that on the system. Especially that nurses have dangerous idea about the blaming culture.

Disadvantage: will be limited for those who don't have internet access, since it would be costly, computer literacy, IT things (system go down)

Paper system: it is lengthy and consumes time.

Interviewee 5: TVN specialist, primary setting, combination system of recording PU data

What they record:

The community nurses in different settings record the following data: baseline information of the PU patients (NHS number, demographical data), PU data (size, site, where originated, date received, interventions, ..., next visit.)

PU data recording (How they record):

The nurses in the community setting (DN, community hospital) are recording PU data in paper records, while the TVN in the trust have an electronic system that available for the TV department and not for the nurses in the settings.

Nursing homes have their own system (separate, independent).

Any patient come to the DN or community hospital should be inspected if have ulcer or intact skin. If patient found to have grade 2 >, the patient should be asked from where he get this ulcer (hospital or home). This data and all other related data should be recorded and reported as (significant event). A specific form filled for that purpose contain all the ulcer details, and sent to TVN (fax), where she can store and enter the data on her e-system. Then she can collate all data from all the settings and produce monthly report for the trust board level.

PU data reporting:

When there is a case of PU, the nurses should report that to TVN. Fill the specific forms for that send it back to her by fax.

No e-reporting, just paper one. She thinks if there is an e-reporting this could enhance the accuracy of data.

There is a problem of under-reporting for PU, especially the superficial cases. Nurses tend not to report grade 2 mainly, but she can discover that when they ask for devices, because this done through her, so when they asking for device she check if the significant event forms filled or not.

PU data referring:

(All cases with >2 should reported, G3 and 4 should referred)

No specific form for referring, through the incident form.

The protocol: she should see the sever ulcer 3 and 4. But, due to time limits and huge trust, she sees all grades 4 and most grade 3.

How audit conducted:

Once a year, send forms to nurses in their settings, they fill the form in their caseload or wards in that designated day; send the forms back to the TVN. In this form the number of PU patients in the caseload or wards requested, in addition to the total number of patients in the setting or visiting the setting, and the total number of population that covered by that setting also requested.

Then prevalence calculated by dividing the number of patients with PU found in the caseload/ total number of patients registered or seen by the DN (she see usually the chronic conditions patient, they exclude patients come to DN for monthly injection or those for cast care).

She think, It would be an inaccurate to include all the population in calculating prevalence because there are more than the half at least is healthy and this unreasonably will decrease prevalence rate, also there some patents may not come to the clinical settings and receive there care by their families so those out of there recording and not calculated (this may

make accuracy questionable), she know that her data not accurate 100% and this can not be guarantee anywhere. But try her best may if there is more features on the e-system this will increase accuracy.

PU data using:

The data collected are useful.

She can use the data to produce monthly report to trust board level: to decide about equipment, if they need more or not.

- *What lesson learnt?*

They can use the data to make investigations especially if there is an area of high incidence, and could initiate safeguarding procedure. Or they may conduct thorough training and education in this area of high PU rates.

Moreover, this data can be used as quality indicator.

Pros and cons of recording system:

Advantage of e-system: They have e-system but not fully, need upgrading, use also some sort of paper record.

Through her dealing with e-system she found it much easier and the data will be more accurate, can easily generate reports through it.

Disadvantage: the absence of e-reporting may limit the accuracy some times, and the reporting will be delay, not on real time especially that some ulcers need immediate intervene, that because the reporting will be in just clicking the mouse, rather than waiting the paper forms to come then collating all these forms together.

Paper system: difficult to deal with especially many setting refer to this trust. She thinks also that the documentation will be inaccurate on the paper system. Generating report is a complicated process consumes much time to collate all the forms from different settings.

Interviewee 6: TVN specialist, primary setting, combination system of recording PU data

What they record:

They record the number of PU, grade, origin of ulcer.

PU data recording:

If any patient visits this community setting, the nurses assess him, if he have grade 1 or more ulcer, then the nurses will record PU data on paper record. Send these data on monthly basis to the TVN. These data come from the DN in the community only (community hospital have their own separate recording system, and regarding nursing homes; they did not collect the data yet from them, since they are newly started collecting the data). Then the TVN can enter these data on an electronic database special for TV department. So, they have a combination system of recording.

PU data reporting:

By filling the monthly report, the nurses report all PU cases including grade 1. No E-reporting, just paper one.

There is a problem of underreporting. Lack of nurses knowledge is the reason, she blame the education system and recommend adding some TV courses to the curriculum.

PU data referring:

No specific form, from the data that the nurses supplied in the monthly report. The protocol: she see the sever grade 3 and 4. The nurses not refer any cases directly to the TVN, she can automatically follow-up the cases. Review her system all grade 3 and 4 PU followed up.

How audit conducted:

The TVN send the DNs in the community an audit forms on a yearly occasion. The nurses then fill these forms in, which ask about the number of PU in each setting, and the total number of patient in the caseload. The forms back to TVN where she can calculate the overall prevalence in the trust.

PU data using:

She sees that data collected are useful.

They can produce report from the system. In this report they can know the number of PU patients, can monitor incidence from period to another, where the PU patient found and in which setting. Identify the area of high incidence.

Pros and cons of recording system:

They use a combination system, the nurses record on paper record and send this to TVN; she entered all these data on her electronic system. The advantage of this system is the accuracy; quickly, generate report.

Disadvantages: Presence of electronic system will not stop him from underreporting.

Paper system: slow compared to electronic one in generating reports, so it can consume time.

Interviewee 7: TVN specialist, secondary setting, combination system of recording PU data

What they record:

The nurses in the wards document the following item for each PU patient: date of admission, grade, location and origin of ulcer, Waterlow risk assessment score on admission, skin inspection findings, prevention plans and equipment used.

PU data recording (How they record):

When PU occurs or patient admitted with PU, the ward nurses fill a specific paper form for that. Then they leave a message or send E-mail to the TVN to inform her about that on monthly basis. The TVN receive the forms, process it, and insert all the data to electronic system available only to TV department (nurses are report on paper and TVN record on E-system)

PU data reporting:

The nurses report PU cases to TVN by filling the forms and send it to the TV office on monthly basis.

The problem as advised by this TVN, that not all PU cases are reported by the nurses, and even if reported. It is not reported on real time (she think it could be easily and better if there is an E-reporting system).

PU data referral:

There is a specific form for that, and there is a policy as well. The protocol of referring: if patient assessed to have PU (G1-4) it refer to the TVN to assess him. They refer cases to TVN to seek her advice in care plan and to have equipment, since that the TVN is the responsible for issuing equipments for the patients in wards.

How audit conducted:

TVN send audit forms to ward nurses on specific day quarterly, the nurses fill the forms and back it to TVN where she can review and collate forms and generate prevalence report.

PU data using:

All of these data are useful because it can be used to generate a feedback to ward managers, linked nurses, and for the whole trust.

- Can generate incident and prevalence report (incidence monthly and quarterly prevalence audit, but the problem in prevalence data that it cannot identify where the PU originate)
- Some type of data; used to educate and train the staff for RAS, GS, prevalence and incidence.

Pros and cons of recording system:

Nurses on wards document PU data on paper refer this information to TVN, then the TVN can transcribe and enter these data to computerise system (just available for TV services) the most important advantage for this single system is to generate report to show the size of the problem in the trust by giving prevalence and incidence figures (although it is crude figures).

Disadvantage: it is like simple software, not linked to other hospital services, so the lab test, medication and many other data not linked to this system, just PU data that based from nursing notes and forms.

- Not accurate most of the time, because there is a problem of underreporting; the report that generated from this system based on the quality of data provided by nurses, if there is inconsistency, missing, delaying in reporting, the quality of data will affected. But, in any way it can give some snapshot and idea about the situation in wards. (this can be considered as a challenge not as disadvantage)
- Slow down, need long time to login to the system (half an hour); so it is time consuming and wastes the time.
- Difficult to use (pain to insert the data)
- Hope to change the system with more updated one.

Paper system: the accuracy of data not depend largely on the system, this depend on the quality of data that the nurses provide it. Nurses record PU data on paper, and give the same data to the TVN, and the TVN enter the data as it come. This mean the quality of data depend on the nurses reporting and recording of this data. So, the computerise system used by the TVN have no effect on that, will not guarantee the accuracy, will not discover the inaccuracy.

Interviewee 8: TVN specialist, secondary setting, combination system of recording PU data

What they record:

The ward nurses inspect the patients, if any ulcer found all related information will be recorded to each ulcer; like; size, site, grade,..... This assessment based on admission to the hospital, then repeated weekly, when transferred, till the patient discharge from the hospital.

PU data recording (How they record):

All of this information recorded on both the electronic and paper system (recorded on paper record and then inserted to E-system). In this case, a combination system used between the E- and paper system, they use parallel system for 3 months period till full transferring to E-system in recording PU data. They are now on transition stage between the two systems, so the TVN provide now training for staffs on recording PU data on the new E-system for 3 months till full transforming to E-recording.

Because it is a transition stage the ward nurses still record all the data on paper and some on e-system. So, they send monthly report to TVN that contain all the PU patients in their wards, who can insert any missing data on the electronic system.

PU data reporting:

Through the monthly sheet, that the nurses record all PU patients on it, with full assessment and the ward name on it and direct it to the TVN. This sheet submitted at 28th from each month. But when there is a new PU case they report that to him by telephone.

Till now and because they not implement the full version of the e-system, there is no E-reporting of the cases. This TVN if there is an E-reporting system, this will give a reporting mean that can report the cases on real time occurrence, which may foster the beginning of prevention program especially if it reported immediately when there is a redness or grade 1.

PU data referral:

No specific direct form for referral just the monthly sheet. The new cases reported to him by telephone.

Protocol of referring: All PU cases refer to the TVN (grade 1-4)

The TVN take the advisory role, any patient refer to him by the wards, he prioritising these patients in receiving the mattresses and other intervention, assess the patients and plan the care for them, ensure that the plan implemented by the ward nurses, then follow-up and weekly evaluation of the patients. The urgent referral can be seen within 24 hour, not urgent 24-72 hours.

How audit conducted:

The ward nurses make the notes and send reports to the TVN on monthly basis, contain all PU cases, the new and old one with its grade and full assessment. TVN review the reports, processing them and produce the incident (monthly) and prevalence (annual) reports.

PU data using:

Most of the data that collected are used efficiently. The data that recorded either on the paper or E-system can be used to generate reports, like; incident and prevalence reports, conduct a PU audits, can be directed to the head nurse of each ward to see the incidence and prevalence in each ward to give extra attention and individualised care plan to those with higher rate. These reports also directed to nursing director for quality programme improvement.

Pros and cons of recording system:

The current TVN try to convince the administration of the hospital of the benefits of applying e-system, especially they are now on the transition stage (he try to convince the administration that using e-system is more beneficial), and comparing between paper and E-system are possible in this case.

The benefits that gained from this short experience and as this TVN perceived and thought:

- Real time reporting: when there is an E-system the nurses can report PU occurrence electronically, which make it easy to follow the patients.
- Can easily calculate the prevalence and incidence and generate reports later on.
- May prevent further destruction of ulcer: by real time reporting the TVN can make assessment for the patients and design plan of care to the patient and ensure implementing this plan by the ward nurses and evaluate the interventions. This will be possible especially when the ulcer reported in early stages.
- Time can be saved, especially that the nurses have no time to fill paper forms, so using E-system and by using just mouse click can send report, also there is only one TVN in whole hospital which make it difficult to review all the paper record of these patients, it is more easier to just shifting between the patients just by clicking on the mouse.
- The data available most of the time, and continues follow-up. Because it available in electronic format, and no need to request in the paper file of the patient.

It can be easily searched as well, e.g; albumin level for a patient admitted two months ago can be retrieved easily, in paper it will be difficult (files bulky), if the data not in first place.

But, he thinks that the confidentiality and security of patient data could be affected using e-system.

Paper record: need long time for documentation, and for collating the data from all the wards. Difficult to deal with. Data available only when patient in the hospital and if he discharge the files will be archived. So, if in the future patient need outpatient help the file need to be requested, while in the e-system just by entering his I.D number all his data will be on the screen in front of the TVN. Also, these records are available for one person at one time in one place.

Interviewee 9: TVN specialist, secondary setting, paper system of recording PU data

What they record:

When patient admitted assessed for risk using waterlow scale (Repeat DAILY as a minimum whilst on an acute wards and repeat WEEKLY within rehabilitation, post operatively, or when there is a change in condition / mobility.), and then putted on the flow chart designed at the trust level to deliver the care. All other data like; grading and assessing of PU are suppose to be recorded in the patient files, but there is some cases that not documented completely or documented elsewhere in the system, that make it difficult to refer to this data.

PU data recording:

In this case, the hospital use paper system to record PU data, although there is some type of electronic data for financing and medical referring in general, no specific patient data are found in the system, they still rely on paper system for PU data.

PU cases grade 2 and above recorded on paper record as clinical incident, and send to TVN in a weekly basis.

PU data reporting:

If new ulcer develop; grade 2 and above, the patient should have Incident reporting form completed as recommended by NICE guidelines (2005) and send to TVN in weekly basis. The new admitted patient with PU also reported using Telephone or Pager. No E-reporting, it is better if there is one as she think.

PU data referral:

There is no specific form of referral.

The protocol of referring; if patient was assessed and found to have ulcer G2 or above, the patient should refer to the TVN to assess him→ then she can consult the flow chart of care.

How audit conducted:

The *prevalence* data collected through one day annually at the trust level. Usually it is done in conjunction between the hospital and the company that provide PU preventive measures like mattresses. Usually the company team and the TVN sit together to design the survey questions, conduct the survey together, when they come to wards they ask for the nurses' help, to give them specific information about the patients because they know more about the patients. The audit used to engage the hospital staffs especially the nurses in the survey, so it can be used to educate, train nurses on conducting prevalence survey, and it is elements like risk assessment and ulcer grading.

Incidence: through the incident form: patients from admission till discharge assessed daily using waterlow scale, any patient seen to have grade 2 or above, they putted in the incidence form (as recommended by NICE guidelines (2005)), and the TV department informed about that to generate incidence report and to ensure best treatment provided to those patients, because they are at the same time referred to the TVN.

PU data using:

Most of the data collected are useful, usually it is used for quality purposes, and it is reported to the managers. Sometime these data can be used to take the decision of purchasing, if they found that incidence or prevalence of PU data high, may decide to buy more mattresses or other forms of preventive devices.

Pros and cons of recording system:

This TVN specialist used to care for PU patients for more than 10 years. She dealt with PU data on both system paper and electronic (she now uses the paper system); she found that the E-system better in term of:

Paper system is very difficult to retrieve the data, even if there is specific paper format for recording PU data, the reason that because the nurse's still record data anywhere in the file, which make it difficult to review patient file. Moreover, not only nurses document on these files, every healthcare professional do so, which further complicate the reviewing process. What else, when the patient discharge, the file no longer available, and need ordering and requesting to bring it again which take much time, this is maybe acceptable in PU cases, but imagine in Emergency situation.

But, at the same time, the paper system is familiar to users, where most of the nurses know how to deal with paper form but not the electronic one, especially that many nurses are come from the middle age group, and those more comfortable to deal with the paper records.

Electronic system: easily accessible, anytime from any place, she used to have E-system (computer) in patient rooms (in a previous post), the data can be entered directly. Presence of mandatory field for entering the data make the documentation complete, you can't transfer to other piece of information without filling these data before, in paper case; the nurses not obligated to document all PU data, they document any piece of data that convenience to them even if there is documentation and care guidelines. Moreover, the electronic forms required to be filled step by step, so it is guide the people how to document PU data, especially the assessment component of recording.

Disadvantages of E-system: the system need time for the nurse to engage in, because some time it difficult in term of education and getting in, the other problem, is the confidence of using E-system, nurses are computer illiterate, not comfortable to use it, so entering data will be pain to them, and they fear from losing data. Finally; the access to computers sometime difficult because of financial problem, there is no enough terminals.

Interviewee 10: TVN specialist, secondary setting, electronic system of recording PU data

What they record

They record waterlow risk assessment (which carried out on admission, reassessed once a week, or when patients condition changes), skin and PU assessment (size, site, grade, colour), nursing notes, medications, care plans, equipment used for prevention and treatment, dietician referral and blood tests.

PU data recording (How they record)

In this case, the hospital uses hospital information support system (HISS) for recording patients' data in general and PU one of these data that recorded in the system. All data mentioned above that related to PU patient can be found on this system.

PU data reporting

When PU occurs the nurses can report that electronically on the system. If they record that immediately to the system, the TVN can know about the PU case at the exact time of occurrence. This feature of the system makes the step easier, accurate and timely.

PU data referring

Also the nurse can refer the PU case to the TVN via the system, at the same time they report and refer. No specific form, she can automatically follow the patient need referring to her by reviewing the system. She has specific guidelines to look at when she wants to visit patient or provide her care to him:

- Has grade 3 PU or above as her system show.
- Require alternating mattress as the nurses request, and she can then assess the patient and see if he need that or not, and prioritise the cases.

How audit conducted

When the nurses fill all the details of PU cases in their wards, like how many patients with PU, the characteristics of this ulcer. She can then review her system, and by clicking the mouse she can generate a report of the incidence of PU over a specific period (monthly in this case) (That done by reviewing the system only, not actual audit)

PU data using:

Although data recorded in the system can be used in different ways, it can be used to generate regular reports, incident studies and to conduct a wound assessment audits. In sometimes the collected data may not used. In this case as example, the prevalence information (which is consider one part of PU data) not regularly collected. The last prevalence study was before 4 years, because after 12 consecutive studies, it was decided to be useless, because no one have looked at the collected prevalence data.

Pros and cons of data recording system:

There are two main benefits for using the electronic system for recording PU data:

1- When PU occurs, the ward nurses can report that on the system and refer patient to the TVN in the hospital, which make the step easier, accurate and timely.

2- The TVN can conduct a regular incidence report (monthly in this case). The ward nurses assess the patients on admission and record if they have PU or not on the system, then if they develop a PU later it will be recorded also on the system, so, the TVN can track patient from admission till discharge and note if they develop PU or not, electronically without filling forms or any paperwork.

Through these regular reports, the quality will monitored and the effectiveness of some intervention can be evaluated.

Interviewee 11: TVN specialist, secondary setting, paper system of recording PU data

What they record:

When patient come into a ward, the nurses their assess the patient risk using Waterlow, if PU founded, they record on an incident form all patient data; like: name, age, DOB, date of admission, ulcer characteristics, dietician need, prevention provided.

PU data recording (How they record):

The nurses document PU data on patient paper files and if G2 and above it will recorded on incident form. This form will fax to TVN and she will be informed on monthly basis. The TVN collate the paper forms and generate reports.

PU data reporting:

The ward nurses can report PU case through filling incident form. No e-reporting. Not on real time because if she OFF, she can know that when she return. They work to make the reporting within 4-6 hours of PU occurrence.

PU data referral:

Bby the same incident form. No specific form.
The policy of referral: she see only grade 3 and 4.

How audit conducted:

A prevalence audit conducted once a year (usually in October). TVN conduct it in sharing with the company that supply the equipments, they send the paperwork to the nurses, show them how to fill it in, assessed each single patient, review their files, then follow up the process of entering and collecting data by the nurses, and check the data for any missing.

PU data using:

Most of the data are beneficial. They can generate monthly report of the incidence and once annual prevalence report. The data collected from the ward nurses can be used to make an audit. By these periodical audits, year by year they discover if the prevention program followed is useful or not.

They can also use the data collected on the audit for the purpose of education and training for the nurses. She trains them during the audit how to fill the forms, which is mostly about grading of ulcers and assessing of the risks. So, by indirect way she educates them about PU grading and risk assessment.

Pros and cons of recording system:

The nurses record on paper system and send these data to TVN who also deal with paper records.

This TVN think that there is no difference in both systems in any term. Because this depend on the person who will give the data. The electronic system can not guarantee that it should be accurate than paper, but it can make it easier to deal with data. This TVN also think that any e-system could be enhanced and improved if there is a mandatory field, which need to be entered for each patient, this could enhance the data quality as she think.

Interviewee 12: TVN specialist, secondary setting, combination system of recording PU data

What they are record:

The risk assessment scores recorded, patients assessed for PU risk using Waterlow scale within the first 6 hours of admission, weekly, and then depend on patient condition. In addition to the ward name, number of patients with PU, grade, location, prevention, treatment, and where the PU originated (home or acquired).

PU data recording

In this case the hospital used complete paper system for recording all patients' data. The TVN have a computerized program to document PU data on it. That done when the nurses in the wards document this sort of data on paper forms send these forms on regular basis (weekly) to TVN to enter these data on the TV computerised system to generate required reports.

They do weekly PU audit form. In this form that submitted to the TVN every Monday (and retain a copy for the ward) they document: ward name, number of patients with PU, grade, location, prevention, treatment, and where the PU originated (home or acquired). For each single PU patient, they complete a clinical incident form for acquired PUs of grade 2 or above and photographed the ulcer as per policy; (include; date of admission, if the PU present on admission, location, grade, prevention, treatment, where PU originate)

PU data reporting:

the ward nurses report PU cases grade 2 and above for the TVN via the weekly form and fax it to her.

PU data referring:

the weekly form used also as a way of referring PU cases to the TVN. After receiving the forms, see grades 3 and 4. The TVN prioritise the cases and deal with PU with the linked nurse in that ward. Usually, cases seen within 1 day, 48 hr, 48-72 hr depend on the case (priority).

How audit conducted:

She stops doing prevalence as mentioned earlier. The incidence calculation depending on the weekly form that submitted by the ward nurses. She can easily calculate the incidence by dividing the number of patients who develop ulcer in that week over the total number of patients multiply by hundred per cent. She can also calculate that for each ward, hospital or the whole trust. Moreover, she can calculate it for every month by collating data for 4 weeks.

PU data using:

Most of the data collected are used, especially the incidence, she stop doing prevalence. She thinks incidence give more reliable, regular and relevant information.

Based on the data collected (on weekly basis), she produces quarterly report for the trust board level, and three times or bimonthly report for the ward managers' level. This report

can be generated electronically from her system. She can then write analysis report called "ROOT CAUSE ANALYSIS FOR HOSPITAL ACQUIRED PRESSURE ULCER", In this report they document: date of admission, date of identifying PU, wound characteristics (size, location, grade, dressing type, where originated), waterlow score on admission and when PU identified, change in patient conditions, ensure that policy applied (ulcer photographed, position, mattresses, and cushion used), if PU has been avoided, and lessons learnt from this case. The response rate from each ward can be calculated by filling the weekly forms. This bit of information included in the report as well.

Pros and cons of recording system:

In this case a combination system has been in use. The nurse's record PU data on paper system, send this data to TVN. The TVN enter all these data on her computerised system which is available only for TV office. She can generate reports by just clicking on the mouse. She thinks this system is easy to use, quick, can save time. While on the other hand, she think that the paper system that the ward nurses use is just cluster of documents make it difficult to deal with.

Interviewee 13: TVN specialist, secondary setting, combination system of recording PU data

What they record:

Risk assessment score, characteristics of ulcers.

PU data recording:

When the patient admitted, the ward nurses assess them for PU risk using Waterlow, then daily, if there is PU they document them on regular patient file (paper). If this ulcer is grade 2 and above a separate monitoring form that contain full assessment of the patient will be filled and send to the TVN by fax.

Beside the paper form, they record some of the data on the electronic system, since they are in transition stage for 3 months between the two systems. So, now all the data recorded on paper and some on electronic data.

PU data reporting:

The nurses report all grade 2 and above to the TVN via the monitoring form. So, it is paper reporting, the new electronic system will have e-reporting feature, where they did not use it yet. This TVN Think that there is problem of underreporting because the nurses do not have the enough knowledge of PU.

PU data referral:

There is no form. Policy: if there is patient, with grade 3 and 4 they telephone TVN and inform her. What she can do: Can plan of care, assess patient, and make some dressing and debridement and follow-up the patient.

How audit conducted:

Annual prevalence. The company that provide the hospital with the mattresses conduct the prevalence with conjunction with the TV team.

PU data using:

The data collected is useful.

It can be used as nursing performance indicator, especially the data that contain figures like incidence and prevalence reports.

Pros and cons of recording system:

This hospital now using paper record but they are in process of changing to electronic record (for 3 months together, they spend one week till now).

Advantage of the e-system:

On the new system, they will be able to report PU electronically, document all PU data, and ordering a mattress or device will be mandatory conducted via the system.

Reports can be easily generated and it could be more accurate. Using e-system will be easier, more efficient, and time saving.

The disadvantages that could face the E-system, that some nurses are illiterate (this can be solve by passing the information to other who know how to use, and training on the system may solve the problem), failure of the system that lead to loss of data, and this will minimise the acceptance of the system.

Disadvantage of paper system:

The problem of the current system (paper) as this TVN think is in the filling of the long paper format that is an additional job for nurses whom already have shortage and this consume time, typing problem (unclear hand writing), and nurses busy to document, sometime there is a missed in patient data.

Interviewee 14: TVN specialist, secondary setting, combination system of recording PU data

PU data recording:

The ward nurses record all PU data on paper system. If there is a grade 2 and above ulcer, the nurses fill an incident form on an electronic system called DATIX, the TVN can review the system and see the reported PU case at the time of reporting. The system has the feature that he can send e-mail to the TVN that someone report PU. So, they have a combination system of recording where the data is available in two formats.

PU data reporting:

All grade 2 and above reported through Datix system. So, it is electronic reporting.

PU data referral:

No specific form.

Policy: from reviewing datix system, she will follow up all grades 3 and 4 ulcers.

How audit conducted:

Quarterly audit. The TVN issue an audit form to each ward on specific point of time, the nurses their record the data on this time (including number of PU cases, characteristics of each ulcer). When completed send to the TVN, where she can collate the data and produce the report.

So, the prevalence data collected through paper forms, while the incidence can be collated and calculated from the Datix system (electronically)

PU data using:

The data is useful. It can be used as a feedback.

They produce a quarterly report to be presented to the trust board, short report. When the data tells that there is an area of high PU, it helps in look at that, try to know the reason.

Pros and cons of recording system:

This case has a combination between paper and E-system; some of the data enter on paper other on E-system. Prevalence data filled on specific form issued quarterly for this purpose. Incidence reported and recorded on specific E-system (Datix). But she thinks no difference between the systems in term of accuracy or quality of data, because this rely on the person enter the data not the type of record. But it could be quicker and timely to report on electronic system.

Interviewee 15: TVN specialist, secondary setting, combination system of recording PU data

What they re record:

Grade, site, size, location, depth, width, necrosis, origin, time of occurrence, dressing.

PU data recording:

The nurses record PU data into paper system. If there is a grade 2 and above they fill a specific incident reporting form on electronic system called Datix. This system used as a reporting mean, cannot contain all PU data. The TVN review this system in regular basis, and can generate reports through it.

PU data reporting:

All grade 2 and above reporting via Datix. So, it is e-reporting.

PU data referring:

No forms.

Policy: all grades 3 and 4 as seen on Datix will be followed by TVV to ensure that the patient receives the plan of care.

How audits conducted:

Annual prevalence audit. Sending audit forms to ward nurses to be filled on specific date and return it back to her, where she can collate the data and produce prevalence report. The incidence generated through the system in monthly basis. The nurses' report into the system on daily or when ulcer developed, the TVN look continually at this data, to see if there is a referral to her, and she generate incidence report on only monthly basis.

PU data using:

The data is useful.

These reports can be used as a feedback. They can update their knowledge about PU.

Pros and cons of recording system:

This hospital used combination system of recording, paper and E-system called Datix for PU data.

Advantage of Datix: It is a central database that can generate incident reports, where a lot of people can access it at the same time, while paper just one per time in one place.

Disadvantages: not specific to PU, it is a general clinical incident reporting system. The data documented is incomplete, since it is just incidence data.

Interviewee 16: TVN specialist, secondary setting, electronic system of recording PU data

PU data recording:

In this case, complete electronic system used by the hospital to record patients' data and PU data. The nurses record all patient data on electronic system, and the TVN receive the data in the electronic format.

There is no paper use of recording.

PU data reporting:

All PU cases recorded electronically on the system, this will be use as a mean of reporting and referring. The TVN have access to the system where she can review the cases from her office.

PU data referral:

No specific form. Policy: the TVN can automatically follow the cases that appear on her system to be grade 3 and 4 without the need that the ward nurses should refer these cases to her.

How audit conducted:

The TVN collate the data that comes from the wards and produce report that sent to the ward and for trust level, this is for the incidence.

The prevalence: through sending audit reports to the nurses on annual basis.

PU data using:

The data are meaningful.

She can produce quarterly report for the trust and ward level, about the incidence, prevalence, trends.

These report can be used to show trends, track the performance, and as quality indicator.

Pros and cons of recording system:

Advantages: The nurses fill the form on the E-system more easily, much details can be recorded on the E-system, can see the trend using E-system. They can benefit from the swift E-reporting of PU cases.

Disadvantages: difficulty of using by the staff nurses.

Appendix C4: Pressure ulcer prevalence data collection tool in Jordan

PU Prevalence data collection tool

General data	Hospital code:	Hospital capacity:			
	Ward:	Ward capacity:			
	Number of patient:	Number of ulcer patients:			
Patient data	File number:	Age:	LOS:	Gender:	
	Date of admission:				
	Previous hospitalization:				
Skin examination	Presence or absence of PU:	<input type="checkbox"/> Yes	<input type="checkbox"/> No		
	If present;				
	Number of ulcers:	Grade:	Location:		
Risk factors	Sensory perception:	<input type="checkbox"/> completely limited	<input type="checkbox"/> very limited		
		<input type="checkbox"/> slightly limited	<input type="checkbox"/> no impairment		
	Moisture:	<input type="checkbox"/> constantly moist	<input type="checkbox"/> very moist	<input type="checkbox"/> occasionally moist	<input type="checkbox"/> rarely moist
	Activity:	<input type="checkbox"/> bedfast	<input type="checkbox"/> chairfast	<input type="checkbox"/> walks occasionally	<input type="checkbox"/> walks frequently
	Mobility:	<input type="checkbox"/> completely immobile	<input type="checkbox"/> very limited	<input type="checkbox"/> slightly limited	<input type="checkbox"/> no limitation
	Nutrition:	<input type="checkbox"/> very poor	<input type="checkbox"/> inadequate	<input type="checkbox"/> adequate	<input type="checkbox"/> excellent
	Friction:	<input type="checkbox"/> problem	<input type="checkbox"/> potential problem	<input type="checkbox"/> no problem	
	Incontinence:	<input type="checkbox"/> not	<input type="checkbox"/> occasionally	<input type="checkbox"/> usually/urine	<input type="checkbox"/> double
Prevention	Equipment:	<input type="checkbox"/> No special equipment	<input type="checkbox"/> on-powered	<input type="checkbox"/> powered	
	Position:	<input type="checkbox"/> not planned/irregularly	<input type="checkbox"/> every 2 hours		
		<input type="checkbox"/> every 3 hours	<input type="checkbox"/> every 4 hours		

Appendix C5: Permission to use Braden scale

Date: August 17, 2009

To: Ahmad Tubaishat, Research Student – De Montfort University

From: Barbara Braden, PhD, RN, FAAN, Nancy Bergstrom, PhD, RN, FAAN

RE: Permission to use the Braden Scale*

As holders of the official copyright for the Braden Scale for Predicting Pressure Sore Risk and the interventions, we hereby grant permission for the use of the scale and the protocols in your research.

*It is understood that the name of the instrument and the indication that the copyright belongs to Braden and Bergstrom remain on any copies and that you do not make any changes to the wording or the scoring of this tool.

Handwritten signature of Barbara Braden in cursive script.Handwritten signature of Nancy Bergstrom in cursive script.

APPENDIX D1: The interviewees who participated in the study

Interviewee identifier	settings	Type of record
1	Primary	Paper
2	Primary	Combination
3	Primary	Electronic
4	Primary	Combination
5	Primary	Combination
6	Primary	Combination
7	Secondary	Combination
8	Secondary	Combination
9	Secondary	Paper
10	Secondary	Electronic
11	Secondary	Paper
12	Secondary	Combination
13	Secondary	Combination
14	Secondary	Combination
15	Secondary	Combination
16	Secondary	Electronic

APPENDIX D2: Combination models used for recording PU data in different settings

Interviewee identifier	Settings	Clarification of the combination	Model
2	Primary	Settings used different types of recording; TVN receives two types of records	4
4	Primary	TV office only uses an electronic system	3
5	Primary	TV office only uses an electronic system	3
6	Primary	TV office only uses an electronic system	3
7	Secondary	TV office only uses an electronic system	3
8	Secondary	Transition stage between the two systems	1
12	Secondary	TV office only uses an electronic system	3
13	Secondary	Transition stage between the two systems	1
14	Secondary	Nurses record on paper, and report grade 2 and above cases via Datix system.	2
15	Secondary	Nurses record on paper, and report grade 2 and above cases via Datix system.	2

APPENDIX D3: PU data recording in different settings

System / setting	Primary	Secondary
Paper	Nurses in different primary settings record data on paper and send to TVN if G2> (TVN 1) in paper format as well.	Ward nurses record PU data on paper and send to TVN if G2> in paper format as well (TVN 9, TVN 11)
Electronic	Community nurses in all settings can record PU data on electronic central system, where TVN can view all PU cases in all settings (TVN 3)	All PU data recorded by ward nurses on HISS, where TVN can view it. (TVN 10, TVN 16)
Combination	<ul style="list-style-type: none"> - Community nurses collect and record PU data on paper and sent to TVN; the latter enters the data into a special electronic database for TV department. (TVN 4, TVN 5, TVN 6) - Some parts of the settings record electronically, while others record on paper, so the TVN receives both types of data. (TVN 2) 	<ul style="list-style-type: none"> - Ward nurses record PU data on paper, send to TVN; TVN enters data into E-system. (TVN 7, TVN 12) - Ward nurses record both on paper and on e-system (transition stage); TVN receives paper forms, checks e-system and tries to insert any missing information. (TVN 8, TVN 13) - Nurses record completely on paper, but use electronic clinical incident reporting system to report cases to TVN (TVN 14, TVN 15)

APPENDIX D4: Reporting PU cases

I.D	Settings	Type of record	Frequency of reporting	Reported as:	Reporting grade	Type of reporting
1	Primary	Paper	Monthly	Clinical incident	≥ G2	Paper
2	Primary	Combination	Monthly for those using paper; immediately for those using the Datix system	Clinical incident	≥ G2	Electronic and Paper
3	Primary	Electronic	Reported electronically as it occurs/is admitted	Electronic report	All	Electronic
4	Primary	Combination	Monthly	Paper form	All	Paper
5	Primary	Combination	Monthly	Significant event	≥ G2	Paper
6	Primary	Combination	Monthly	Paper report	All	Paper
7	Secondary	Combination	Monthly	Paper form	All	Paper
8	Secondary	Combination	Monthly	Paper Sheet	All	Paper
9	Secondary	Paper	Weekly	Clinical incident	≥ G2	Paper
10	Secondary	Electronic	Reported electronically as it occurs/is admitted	Electronic report	All	Electronic
11	Secondary	Paper	Monthly	Clinical incident	≥ G2	Paper
12	Secondary	Combination	Weekly	Clinical incident	≥ G2	Paper
13	Secondary	Combination	When occur or admitted	Monitoring form	≥ G2	Paper
14	Secondary	Combination	Reported electronically on Datix as it occurs/is admitted	Clinical incident	≥ G2	Electronic
15	Secondary	Combination	Reported electronically on Datix as it occurs/is admitted	Clinical incident	≥ G2	Electronic
16	Secondary	Electronic	Reported electronically as it occurs/is admitted	Clinical incident	All	Electronic

APPENDIX D5: Referral protocols

	Referring form	Referring protocol
1	Yes	PU>8 weeks not healed, deteriorated wounds, deep ulcers grade 3 and 4.
2	No, monthly incident forms, and reviewing the Datix system	Complicated cases that cannot benefit from standard care and need special care plans, and equipment.
3	No, reviewing the electronic system	Non-healed grade 3 and 4
4	No, the monthly paper form	The worst cases (grade 4), in which the help is needed.
5	No, through the significant event form	All grade 4 and most grade 3.
6	No, the monthly report	Grade 3 and 4
7	Yes	All grades for care plans and equipments
8	No, the monthly sheets	All cases (grade 1-4); TVNs assess and prioritise cases, provide care plans and equipment
9	No, the weekly incident form	G2>
10	No, reviewing the electronic system	complex wounds, grade 3 and 4, when equipment are needed
11	No, the clinical Incident form	Grade 3 and 4
12	No, the weekly form	Grade 3 and 4 and prioritise the cases
13	No, through the monitoring form	Grade 3 and 4
14	No, by reviewing the Datix system	Grade 3 and 4
15	No, by reviewing the Datix system	Grade 3 and 4
16	No, by reviewing the electronic system	Grade 3 and 4

APPENDIX D6: PU audits in different settings

Interviewee	Settings	Frequency	How audit conducted
1	Primary	--	Have stopped calculating prevalence.
2	Primary	Annually	Audit forms sent to the nurses to be filled in on specific date and returned; data collated and report generated.
3	Primary	Annually	Audit forms sent to the nurses to be filled in on specific date and returned; data collated and report generated.
4	Primary	--	Difficult to conduct
5	Primary	Annually	Audit forms sent to the nurses to be filled in on specific date and returned; data collated and report generated.
6	Primary	Annually	Audit forms sent to the nurses to be filled in on specific date and returned; data collated and report generated.
7	Secondary	Quarterly	Audit forms sent to the nurses to be filled in on specific date and returned; data collated and report generated.
8	Secondary	Monthly incidence	Reports sent by the nurses reviewed and stored on the system then reports generated.
9	Secondary	Annual prevalence	Real audit carried out with the company.
10	Secondary	Monthly incidence	Electronic system reviewed and only incidence report generated. Have stopped doing prevalence reports.
11	Secondary	Annual prevalence	Real audit carried out with the company.
12	Secondary	Weekly incidence	Reports sent by the nurses reviewed and stored on the system then incident reports generated. Have stopped doing prevalence reports.
13	Secondary	Annual prevalence	Real audit carried out with the company.
14	Secondary	Quarterly prevalence, monthly incidence.	Prevalence: send audit form to nurses to be filled. Incidence: collate the data on the Datix system that come from nurses.
15	Secondary	Annual prevalence, monthly incidence.	Prevalence: audit form sent to nurses to be filled in. Incidence: data on the Datix system, which comes from nurses, is collated.
16	Secondary	Annual prevalence, Quarterly incidence	Prevalence: audit form sent to nurses to be filled in. Incidence: electronic system reviewed, data collated and reports generated.

APPENDIX D7: Usefulness of the collected PU data

Interviewee identifier	settings	Usefulness of prevalence data
TVN 1	Primary	Prevalence data not useful.
TVN 10	Secondary	Prevalence data not useful; incidence data more useful
TVN 12	Secondary	Prevalence data not useful; incidence data more useful
TVN 4	Primary	Prevalence and incidence data difficult to calculate in community
TVNs (2,3,5,7) TVNs (7,8,9,11, 13,14,15,16)	Primary Secondary	Most data collected, including prevalence data, is useful



ELSEVIER

CLINICAL STUDY

Pressure ulcers in Jordan: A point prevalence study

Ahmad Tubaishat ^a, Denis Anthony ^{b,*}, Mohammad Saleh ^c

^a School of Nursing, Al albayt University, Mafraq, Jordan

^b School of Nursing & Midwifery, De Montfort University, 266 London Rd, LE2 1RQ Leicester, UK

^c School of Nursing, University of Jordan, Amman, Jordan

KEYWORDS

Pressure ulcers;
Prevalence;
Jordan

Abstract *Background:* Pressure ulcers are a common problem among hospitalised patients. Several prevalence studies have been conducted internationally but there is a paucity of research on pressure ulcer in the Arab world in general and in Jordan specifically.

Purpose: The aim of this study was to quantify the prevalence rate of pressure ulcers in Jordan, and to compare these figures with other studies conducted using the same methods.

Design: A cross-sectional survey design.

Participants: All inpatients older than eighteen in both university and general hospitals in Jordan. Patients in the emergency, day care and maternity wards were excluded.

Instruments: European Pressure Ulcer Advisory Panel (EUPAP) data collection form.

Methods: The survey was conducted by examining patients' skin. Pressure ulcers were classified according to the EPUAP grading system. Risk of pressure ulcer development was assessed using the Braden scale. Data were collected on preventive measures recorded in the clinical setting.

Results: The overall prevalence rate was 12% (All percentages are rounded to the nearest digit) (7% when Grade I excluded). The sacrum and heel were the most common affected sites. Grade one was the most common grade (44%). Only 17% of the patients at risk received adequate prevention.

Conclusion: The pressure ulcer prevalence rate in Jordan is lower than that published in most studies utilising the same methodology. Despite this relatively low prevalence very few patients at risk received adequate prevention, and there is therefore a need to raise the awareness for pressure ulcer prevention in Jordan. Furthermore, differences in age and frailty in the Jordanian sample could explain the low prevalence.

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* Corresponding author. Tel.: +44 116 201 3909.
E-mail address: danthony@dmu.ac.uk (D. Anthony).

Introduction

Hospital patients are vulnerable to pressure ulcers due to limited activity and co-morbidity. In addition to the pain, scarring and interference with the activity of daily living that it causes, it is costly. Bennett [1] demonstrated that the annual cost of treating pressure ulcers in the health and social care system in the UK was £1.4–£2.1 billion, which is 4% of total NHS expenditure. In addition, it can add about seven days to a hospital admission [2].

Prevalence studies using different methodologies have been conducted in many countries around the world with variation in the prevalence rates. For instance, in the USA prevalence ranged from 14% (2001 and 2002) to 17% in 1999 [3]. In Canada, pressure ulcer prevalence was 25% for acute care settings [4]. In the UK, a point prevalence study in general wards considering a range of wounds, surgical wounds, leg and foot ulcers, diabetics, cancer and pressure ulcer reported 17% pressure ulcer prevalence [5]. However there are methodological differences in these studies making direct comparisons impossible thus the EPUAP [6] methodology was used in this study, since it permits comparisons between recent prevalence studies conducted following their methods.

Only one published work has been located in the Arab world, giving incidence figures from Saudi Arabia [7,8]. So, this study will be one of the first of its kind in the Arab world. In Jordan, no baseline information about pressure ulcer prevalence exists, thus, this study aims to measure the size of problem and preventive activities, and provide a benchmark for pressure ulcer prevalence studies in Jordan, and a comparison with other countries.

Methods

Data collection form

The EPUAP pressure ulcer prevalence survey form was used for this study which has high inter-rater reliability [6,9]. The form used is one page long and contains data in four areas: general patient data, risk assessment, skin inspection and prevention.

The first category includes patients' age, gender, length of stay from the admission date till the survey time, patient specialty, and the previous hospitalisation.

The second category includes patients' risk of pressure ulcer development using the Braden scale. The psychometric properties of this scale have been broadly tested [10–12]. It consists of six

sub-scales: sensory perception, moisture, activity, mobility, nutrition, and friction & shear. All sub-scales are rated from 1 (least impaired) to 4 (most impaired), except the friction & shear which is rated from 1 to 3. The total score ranges from 6 to 23, where lower scores indicate higher risk. In this study, as well as in the EPUAP study and many others, a cut-off score of <17 was considered and patients below such score are in need for prevention care. While the Braden scale presents information on skin moisture, it does not specifically measure continence. Therefore, the sub-score continence as defined in Norton scale was also used [13]. It is in four levels ranging from 1 (continent) to 4 (double incontinence).

The skin inspection category gives specific information about patients' skin. This part is the clinical part of the study. All participating patients were examined. The grade and location of the most severe ulcers were recorded using EPUAP classification system. This grading system has been tested for inter-rater reliability and has a Cohen kappa ≥ 0.80 [14], which is an excellent agreement.

The last category is preventive measures; two main interventions were recorded.

- (1) Equipment which was defined as standard hospital mattress (no special equipment), non-powered device (pressure redistributing mattresses) or powered device (any device with an electrical supply) as defined per EPUAP methodology.
- (2) Intervention, which referred to repositioning; it was documented as not planned/irregular or at frequencies of every 2, 3, or 4 hours as this is also consistent with EPUAP methodology.

Sample & setting

A cross-sectional survey design was used to calculate the point prevalence rate in Jordan. Two hospitals participated in the survey; one is a university hospital and the other is a general hospital. All wards of these hospitals were surveyed except emergency, day care and maternity wards where limited number of pressure ulcers would be expected [15,16]. All patients admitted before midnight on the pre-determined day from each hospital and older than 18 years were included.

Each patient or relative was asked to consent to participate in the survey. The right to withdraw from the study at any stage was assured. This study was approved by the research and ethics committee of each participating hospital and De Montfort University.

Procedure

The current survey was performed according to the EPUAP methodology. Each patient was assessed by the one of the authors (AT), which ensures higher reliability. Skin assessment was carefully performed and pressure ulcers grade one (non blanchable erythema) to grade four (extensive destruction of the skin and underlying structure) identified according to the EPUAP classification system. Risk assessment was performed and the use of preventive measures was recorded. After completion, data sheets were reviewed and any missing data were added.

Data analysis

Descriptive analysis was completed using SPSS 16.0.

Results

General patient data

The number of patients conforming to the inclusion criteria was 359 patients, but 31 declined and 26 patients were not available at time of examination giving a final sample of 302 patients. The demographic details are shown in Table 1.

Pressure ulcer prevalence

Prevalence figures in Table 2 show 36 patients (12%) had at least one or more ulcers grade 1–4, totalling 72 pressure ulcers, of which sacral ulcers (31%) and heels (25%) were most common. Grade 1 and 2 ulcers were twice as common as deeper (grade 3 and 4) ulcers. Excluding grade 1 pressure ulcers the prevalence rate was 7%, the highest in the critical care units (29%) and the lowest in the surgical wards (9%).

Risk assessment

The mean Braden score was 18.4 (SD = 3.96), and the median score was 20 (Range 7–23, IQR = 6). Based on Braden scores, 85 (28%) patients were at risk of pressure development. When assessing the continence level for the surveyed patients, 28% of all patients were incontinent; 11% occasionally incontinent, 14% incontinent and 3% were doubly incontinent.

Prevention

The patients were divided into two groups as per EPUAP methodology based on Braden scores to

Table 1 The characteristics of all surveyed patients.

Demographical characteristics	n (%)
Hospital	
University hospital	175 (58%)
General hospital	127 (42%)
Specialty	
Internal medicine wards	121 (40%)
Surgery wards	115 (38%)
Orthopaedics wards	28 (9%)
Critical care units	38 (13%)
Gender	
Male	176 (58%)
Female	126 (42%)
Age	
<12	0 (0%)
12–18	6 (2%)
19–39	88 (29%)
40–59	112 (37%)
60–69	64 (21%)
70–79	26 (9%)
80–89	6 (2%)
>89	0 (0%)
Length of stay	
1–3 Days	153 (51%)
4 Day–1week	57 (19%)
1 Week–1 month	66 (22%)
1 Month–6 months	23 (7%)
>6 Months	3 (1%)
Braden scores	
At risk (<17)	85 (28%)
Not at risk (≥17)	217 (72%)
Hospitalisation	
No previous hospitalisation (first admission)	208 (69%)
Have previous hospitalisation	94 (31%)

evaluate the adequacy of prevention care. Group one included patients considered vulnerable to pressure ulcer development (total Braden scores < 17) or who had a pressure ulcer grade one to four according to EPUAP classification system. All patients with pressure ulcers had a Braden score < 17. Group two included those patients not at risk of pressure ulcer development (Braden scores ≥ 17). Based on this definition, 85 patients (28%) were assigned to group one, and were considered in need for prevention measures. The remaining 217 (72%) were assigned to group two.

Powered devices were provided only to 34% of the patients at risk of developing pressure ulcers. The remaining 66% received no special equipments. On

Table 2 The characteristics of pressure ulcers.

Characteristics of pressure ulcers	<i>n</i> = 36
Prevalence	
Including grade 1	36 (12%)
Excluding grade 1	20 (7%)
Prevalence according to wards	
Internal medicine	11 (9%)
Surgery wards	10 (9%)
Orthopaedics wards	4 (14%)
Critical care units	11 (29%)
Location of ulcers	
Sacrum	11 (31%)
Heels	9 (25%)
Hips	7 (19%)
Ear	1 (3%)
Ischium	2 (6%)
Elbow	2 (6%)
Shoulder	2 (6%)
Occiput	2 (6%)
Grades of ulcers	
Grade 1	16 (44%)
Grade 2	8 (22%)
Grade 3	6 (17%)
Grade 4	6 (17%)
Location of grade 4 ulcers (<i>n</i> = 6)	
Sacrum	3 (50%)
Heels	1 (17%)
Hips	2 (33%)
Others	0 (0%)

the other hands, 3% patients assigned to the no risk group were placed over protective mattress (Table 3).

More than half of patients at risk, and in need for repositioning, were not regularly repositioned

(56%). Conversely, 3% of the patients were repositioned in bed while they were not at risk.

Adequacy of prevention also followed EPUAP methodology, whereby placing a protective mattress under the patient and repositioning them regularly is considered "adequate preventive measures", and where only one of these interventions is provided, the expression "some preventive measures" was used, otherwise, the expression "no preventive measures" was used.

Only 17% of surveyed patients vulnerable to pressure ulcer received adequate prevention, 44% received some preventive measures and 39% of the patients received no prevention at all. Of those patients received some prevention 61% received repositioning only and the remaining received a protective mattress.

Discussion

Prevalence

A low prevalence of pressure ulcers in Jordan was found, despite few preventive measures in at risk patients. These figures may be due to different demographic features in patients who were included in the current study. Compared to European countries (Belgium, Italy, Portugal, Sweden and the UK) and employing the same methodology [9] Jordan shows several differences in age, patients at risk, continence, and nature of clinical area where patients are studied:

Age: no patient in the Jordanian sample was over 89. In the 80–89 age group Jordan was lowest

Table 3 Allocation of pressure ulcer preventive measures.

	Not at risk, 217 (71.9%), <i>N</i> (%)	At risk or having ulcer, 85 (28.1%), <i>N</i> (%)
<i>Equipments</i>	217	85
Standard mattress	211 (97%)	56 (66%)
Protective mattress (powered)	6 (3%)	29 (34%)
<i>Repositioning</i>	217	85
Not planned/irregular	210 (97%)	48 (56%)
Every 2 hours	6 (3%)	30 (35%)
Every 3 hours	1 (0.4%)	4 (5%)
Every 4 hours	0 (0%)	3 (4%)
<i>Preventive measures</i>	217	85
No preventive measures	205 (95%)	33 (39%)
Some preventive measures	11 (5%)	38 (44%)
Adequate preventive measures	1 (0.4%)	14 (17%)

(2%) compared to the other countries (lowest Portugal 11%, highest Sweden 26%).

Risk: despite younger Jordanian patients, Jordan was roughly in the middle (28% at risk – i.e. Braden <17) between Belgium (35%) and Italy (23%).

Continence: urinary incontinence was high in Jordan (14%) compared to Sweden (5%) which was the highest European figure (mean 3.8%) and lower (3%) in double incontinence than any of the European countries except Italy which was the same (mean European figure 9.2%).

Specialty: it is difficult to compare as no patients from chronic care units were included in Jordan, while this ranged from 2% in Italy to 39% in Portugal. Critically ill patients were higher (13%) in Jordan compared to a range of 2% in the UK and 9% in Belgium.

Prevention

Phillips and Clark [17] state that prevalence studies per se are pointless without exploring preventive measures. Jordan is also different in this respect:

Equipment: Jordanian nurses had lower figures (34%) in providing prevention equipment to at risk patients compared with figures from Portugal (37%), Sweden (49%), Belgium (73%) and the UK (95%).

Repositioning: less than half (44%) of the patients at risk were scheduled for repositioning at regular intervals in Jordan. This finding is not surprising as many developed countries (16% in Portugal and 51% in Italy) experience low prevention care provided to patients at risk of pressure ulcer development [9,16,18,19].

Limitations

Prevalence studies give a snapshot of the existing situation, and an incidence study would be more powerful. The two hospitals were a convenience sample. Moreover, as the data on the repositioning intervention were collected from nurses and their documentation; it was impossible to verify whether these interventions were provided, though this was noted as a limitation in the study of European countries [9].

Conclusion

The current study gives a baseline prevalence rate in acute care settings in Jordan. A comparison with international rates was demonstrated. While prevalence is lower than many countries in Europe, it remains a problem for the healthcare system. A

particular concern is preventive care provided to those patients at risk of pressure ulcer development.

Further work

Similar prevalence surveys in Jordan with a standardised methodology should be conducted on a regular basis, with greater focus on the allocation of preventive measures and assessment of the level of knowledge of nursing staff. An action research programme could be done to concentrate on preventive activities provided for patients identified at risk using Braden score, clinical judgment and other measures (for example serum albumin level).

The raw data from this study could be compared with similar data from other countries to explore the effects on prevalence of demographic variables and preventive measures.

Conflict of interest

There are no conflicts of interest.

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CERTIFICATE OF ATTENDANCE

This is to certify that

Mr Ahmad Tubaishat

attended

Tissue Viability Society Annual Conference 2010
Looking at things differently

Held at
International Centre, Telford
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13 & 14 April 2010

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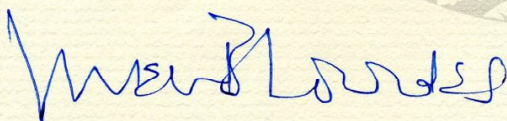
Research Degree Students' Poster Competition and Research Open Day

This is to certify that

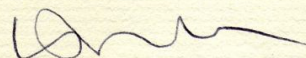
Ahmad Tubaishat

, participated in the Research Degree Students' Poster Competition and
Research Open Day at De Montfort University on

Wednesday 28th April, 2010

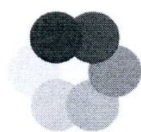


Vivien Lowndes
Pro Vice Chancellor for Research



Kerry Mason
Research Training Manager

APPENDIX E4: NPAUP 2011 Biennial Conference acceptance letter



**NATIONAL
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1025 Thomas Jefferson Street NW
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T: 202-521-6789
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E: npuap@npuap.org
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*The National Pressure Ulcer Advisory Panel
provides multidisciplinary leadership for
improved patient outcomes in pressure ulcer
prevention and management through
education, public policy and research.*

December 17, 2010

Dear Ahmad,

Re: NPUAP 2011 Biennial Conference
February 25-26, 2011
Las Vegas, Nevada

On behalf of the NPUAP Research Committee, I am pleased to inform you that your abstract entitled "**Pressure Ulcer Prevalence in Jordan: A Cross Sectional Survey in 2009**" has been accepted for poster presentation at the NPUAP 2011 Biennial Conference.

Please find attached, a conference brochure with registration and hotel information, as well as poster exhibition information. Please return the forms before January 26, 2011 to qualify for the early bird registration fee. Unfortunately, the NPUAP is unable to offer any financial support for poster presentations.

We look forward to seeing you at the NPUAP 2011 Biennial Conference at Caesar's Palace in Las Vegas, Nevada. Congratulations on writing an informative abstract and thank you for contributing to the conference.

Sincerely,

David Saunders
Executive Director